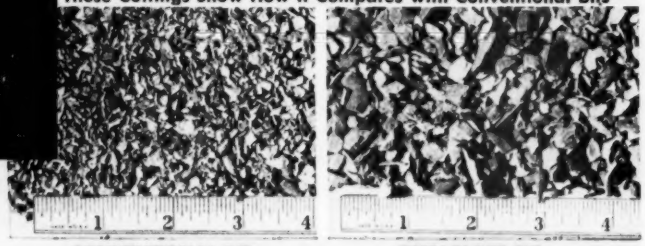
the OIL AND GAS JOURNAL

FROM
REED RESEARCH
COMES THE NEW
REED
TWIN BLAST
ROCK BIT

HERE'S HOW IT WORKS: High velocity slush from the nozzles of the new **REED** Twin-Blast Rock Bit hits the bottom of the hole first—blasting the cuttings from the bottom of the hole as quickly as they are chipped loose to let the cutter teeth take a full "bite" on the formation.

This **REED** Twin-Blast Slush Nozzle is the heart of this great new series of bits.

These Cuttings Show How It Compares with Conventional Bits



CONVENTIONAL BIT **TWIN-BLAST BIT**

Both sets of these cuttings were taken in the same formation, under similar conditions. Those taken with a conventional bit are small, indicating that re-cutting had taken place. Cuttings made with the Twin-Blast Bit were blasted up into the mud stream before re-cutting could take place. The Twin-Blast Bit drilled faster and gave more hole in this formation.

For faster drilling and more hole per bit ...use REED Twin-Blast Rock Bits

REED ROLLER BIT COMPANY
HOUSTON 1, TEXAS

Gulf Coast, Mid-Continent, Rocky Mountain and Canadian Distributor for Martin-Decker Products

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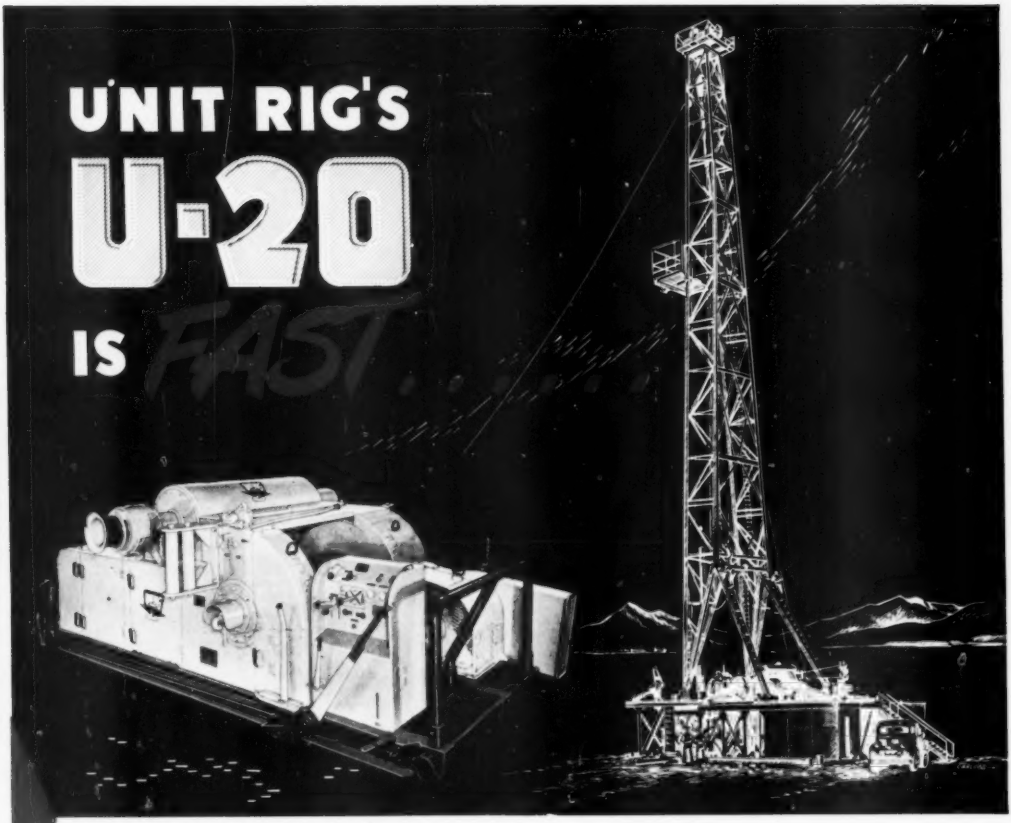
UNIT RIG'S U-20 IS FAST...



The Model U-20 Drawworks has proven that it is a fast, smooth economical rig even under difficult drilling conditions. Drill Faster - - - with the SIX speeds to the rotary table ranging from 57 to 626 R.P.M. at maximum engine speed. Hoist Faster - - - with the SIX drum speeds, divided into a high and low range. SPEED - - - for hoisting empty blocks and POWER - - - for raising off slips readily available thru single lever high-low clutch control. Maximum trip speed is attained by the free spooling drum, hydromatic brake pipe "fall" control and the large powerful drum brake.

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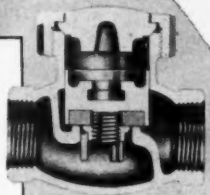
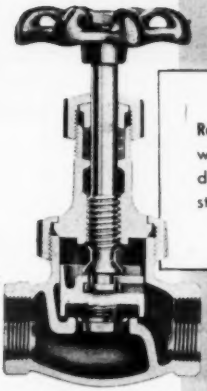
VALVES FOR LP-GAS SERVICE

No. 92LPG Bronze
Angle Valve

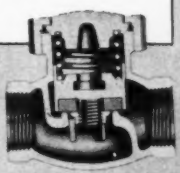
Resilient seat type valves, with synthetic rubber-like discs and specially treated stem packing.



No. 93LPG Bronze
Check Valve — Regular



No. 91LPG Bronze
Globe Valve

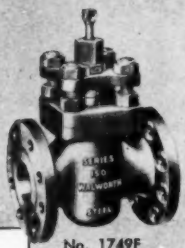


No. 88LPG Bronze
Check Valve — Spring Loaded

Metal-to-metal taper seat type split wedge gate valve, with specially treated stem packing. Metal-to-metal seat valves are limited by UL to branch or by-pass lines where a positive shut-off is not essential.

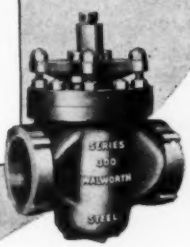
No. 29LPG Bronze Gate Valve

No. 1750

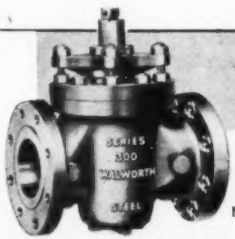


No. 1749F

Steel lubricated plug valves, wrench operated, having screwed or flanged ends and proper lubricant for LP-Gas service.



No. 1760



No. 1760F

Underwriters' Laboratories Pamphlet No. 58 lists requirements for LP-Gas service. Valves are intended for use where working pressures do not exceed 250 psi. — the maximum stop-to-discharge pressure setting of the relief valves on the LP-Gas systems on which they are to be used. This pressure does not necessarily match the manufacturers WOG rating. The Walworth valves illustrated here meet the UL requirements within the set limits. Your local distributor will be glad to furnish complete information, or write to:

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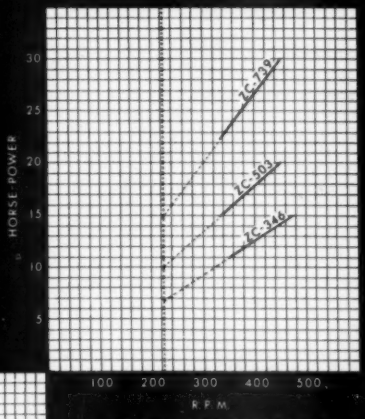
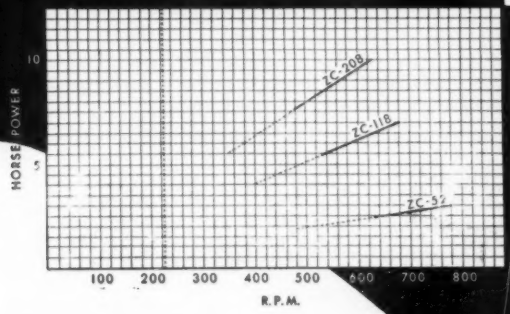
Choose it on these charts...





RATED HP. CURVES FOR CONTINUOUS HEAVY DUTY SERVICE

(Gas or Gasoline)

Recommended continuous hp. for each size engine is shown by the combined dotted and solid graph line which represents the governed engine speed range for continuous service.

Hp. ratings are for heavy-duty continuous service. Maximum hp. ratings are not shown. Highest speed shown for each size is for heavy-duty pumping service, and in every instance is less than 900 f.p.m. piston speed.

To realize the full advantages of ample flywheel effect, it is best to select the engine to operate at the higher speeds indicated by the solid graph line.

Engine should not operate at speeds less than 225 r.p.m., as limited by magneto impulse coupling.

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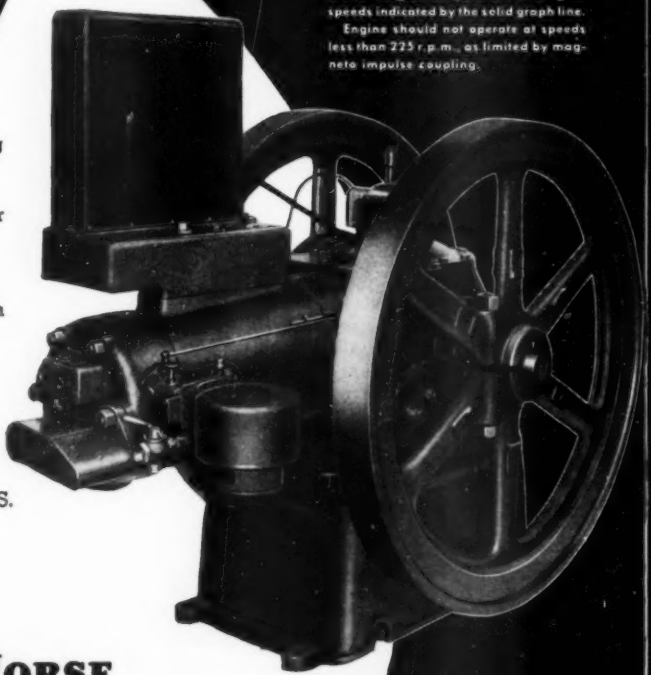
For the complete story on the "ZC" . . . the engine with the *big double wheels* . . . see your local supply store or write Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.



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The Type "H1" Hydraulic Anchor is recommended for use with all Guiberson production-type packers — or any other comparable production-type packer — as a positive means of holding the packer and tubing down while the well is pressured below the packer, as in acidizing or formation-fracture processes. It is also recommended for use in anchoring the tubing and packer in gas or water injection wells where the tubing pressure will exceed the casing pressure. The "H1" can be effectively used as a Hydraulic Anchor to keep the tubing from "breathing" in pumping wells having low working fluid levels.

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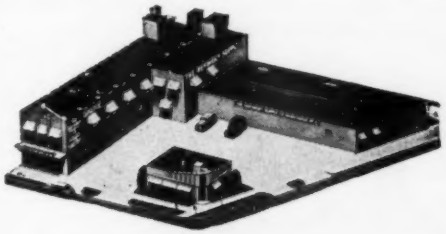

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The newly developed Beckman Model N pH Meter not only meets all these requirements, but also many more. Here are the highlights. Check them over. *Never before have unique advantages like these been combined into a single pH instrument!*

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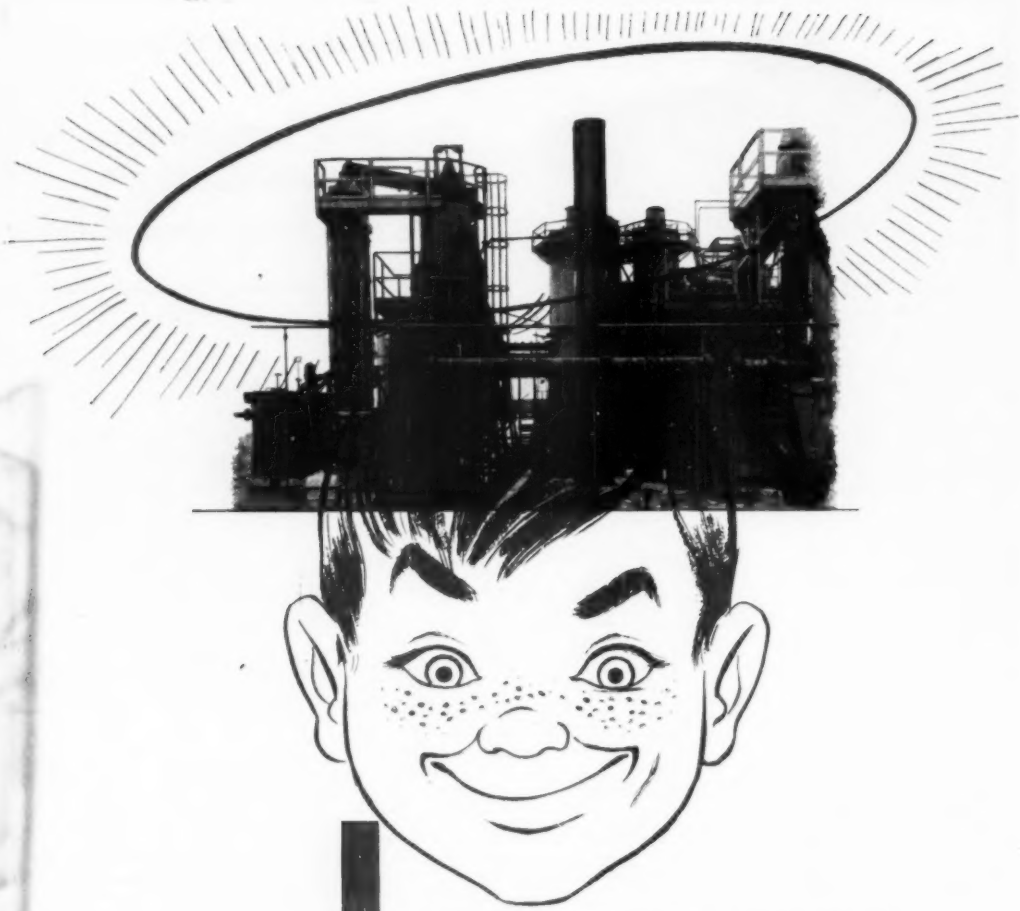

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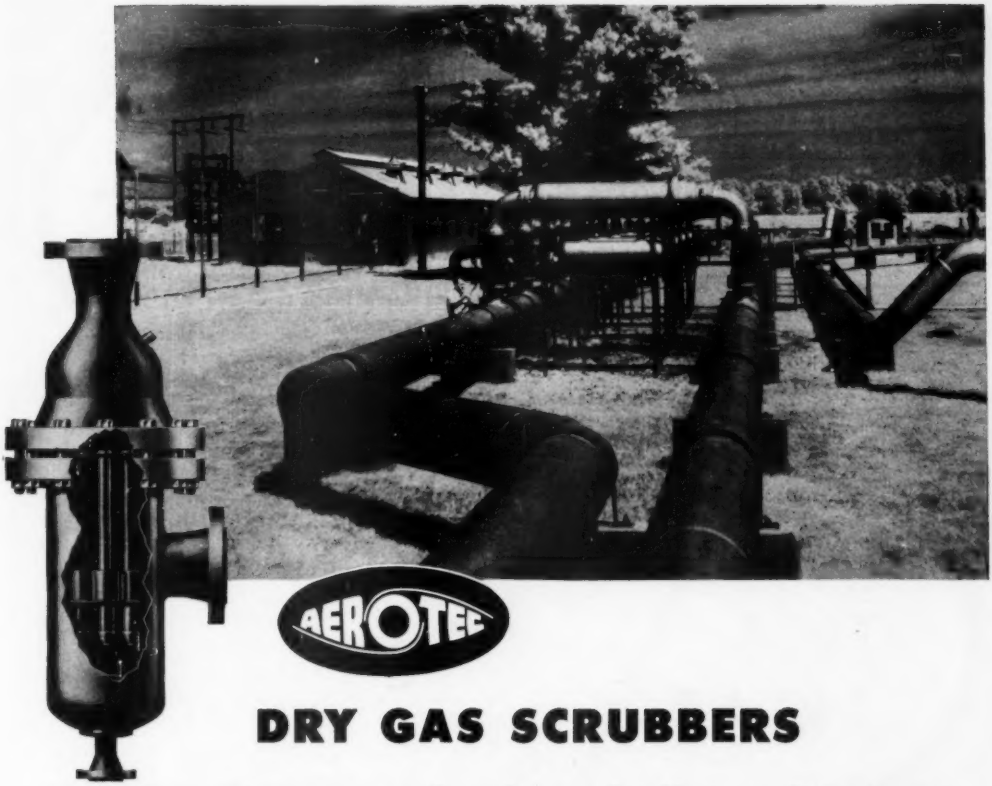

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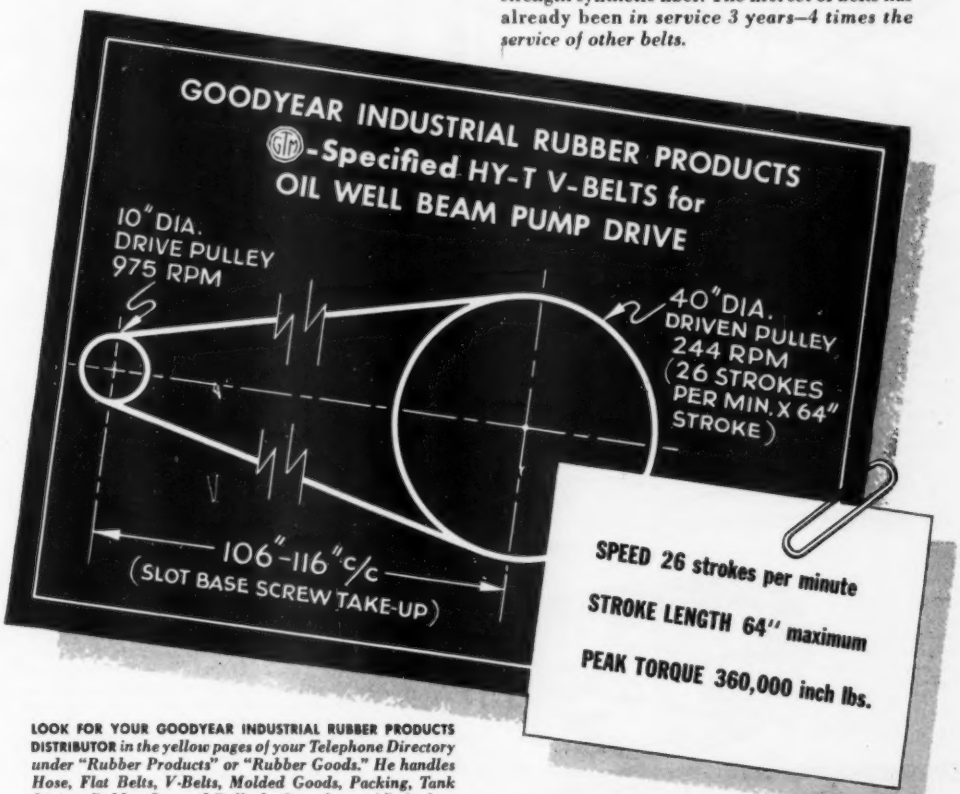

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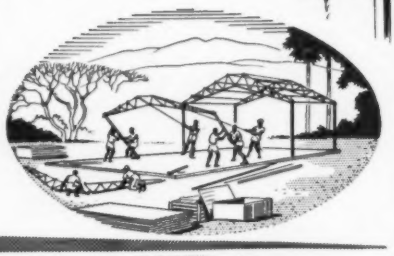
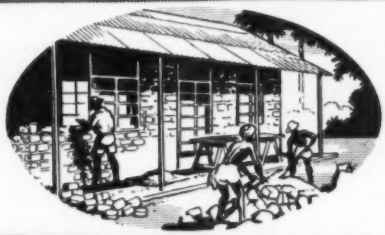
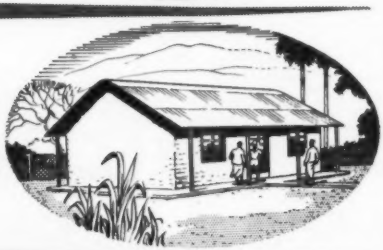


(1) *Here you see an upright of the 'Arcon' framework being raised into position. It takes little more than seven hours for seven unskilled men to assemble a 3-bay unit.*



(2) *Once the roofing is fixed, the walls can be constructed from inexpensive local materials — in this case unfired brick.*



(3) *This is part of the housing programme recently planned for a major oil Company in Persia. The 'Arcon' building is cool, spacious and hygienic, ideally suitable for the purpose.*

When a major oil Company decided to go ahead with a large-scale housing programme in Persia, it chose 'Arcon' because it exactly fulfilled their requirements. The labour at their disposal was able to assemble the framework, roof it, and complete the walls in a matter of hours and the finished accommodation was ideal for the housing of Company personnel and families in such a climate. The buildings are strong, fireproof, termite-proof and almost indestructible, and they can easily be extended when necessary simply by adding extra 'Arcon' bays. The special heat-insulated interior roofing keeps the dwellings cool even during the hot season, and this factor, together with 'Arcon's' spaciousness and cleanliness, ensures the best conditions for employees and their families.

We have also supplied the 'Arcon' Structure for tanning-bark storage in Kenya, saw-mills and joinery works in Tanganyika, and for an open-air theatre-cum-cinema in Australia; all of which illustrates the amazing potential of 'Arcon's' applications, and its value in all parts of the world for an infinite variety of purposes. The 'Arcon' Structure can be used for housing, schools, storehouses and many other building purposes. Its great adaptability and ease and speed of erection make 'Arcon' the natural solution to most accommodation problems; whilst its very nature means that it is surprisingly inexpensive.

We will gladly send you our free brochure giving you full details of the 'Arcon' Tropical Structure. You will be able to see clearly how 'Arcon' can supply the answer to *your* needs.

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May be applied directly over rusted surfaces without removing all the rust!
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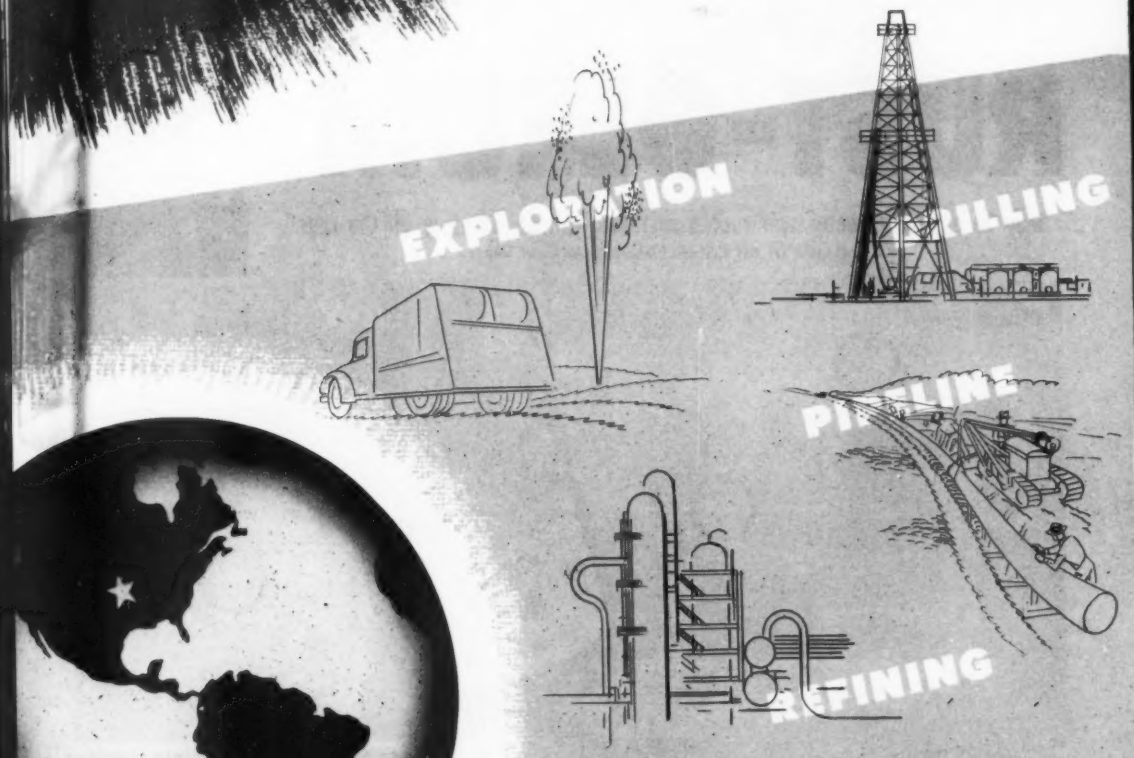
WORLD'S FAIR OF THE OIL INDUSTRY

The International Petroleum Exposition, truly the "World's Fair of the Oil Industry," will be held again May 14-23, 1953, after a lapse of five most important years in the development of new equipment, processes and methods... in exploration, drilling, producing, refining and transporting operations.



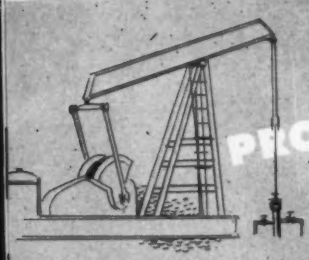
Plan Now to Attend

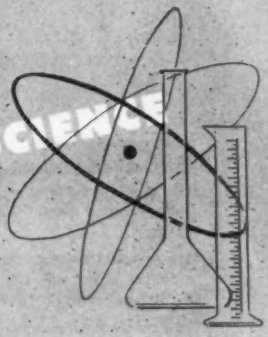
PETROLEUM EXPOSITION

WORLD'S LARGEST INDUSTRIAL SHOW

PLAN NOW TO ATTEND. Executives, engineers, superintendents, contractors, purchasing agents and thousands of other employees of the oil and gas industry will take advantage of the opportunity to study the exhibits.

TULSA
MAY 14-23
1953





THIRTY YEARS
1923 IPE 1953
OF OIL PROGRESS

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regarding space and rates,
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SERVING THE PETROLEUM INDUSTRY
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INTERNATIONAL PETROLEUM EXPOSITION

CEMENTING AT ITS BEST!...

with the help of

HALLIBURTON ROTO-WALL CLEANERS

Simply tack-weld to casing as illustrated.
The number and the arrangement of sections is as flexible as the job requires.
120°

Note this section removed from an experimental well. It shows how Halliburton Roto-Wall Cleaners assure you a tighter, safer cement bond between pipe and wall. See how the cement sets in clean laminated rings without channeling. Notice that dangerous vertical grooves are completely eliminated – the result of rotating the casing.

All standard Roto-Wall Cleaner spikes are high tensile strength spring steel. Their triple-coiled flexibility gives full action, 360° cleaning without bending or breaking. Each section is five feet in length, and since you need only the one base for all casing sizes, Halliburton Roto-Wall Cleaners give maximum utility with surprising economy.

Your Halliburton representative is thoroughly trained and experienced to make recommendations. For cementing at its best, use Halliburton's Roto-Wall Cleaners and Casing Swivels. Phone your nearby Halliburton representative. Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

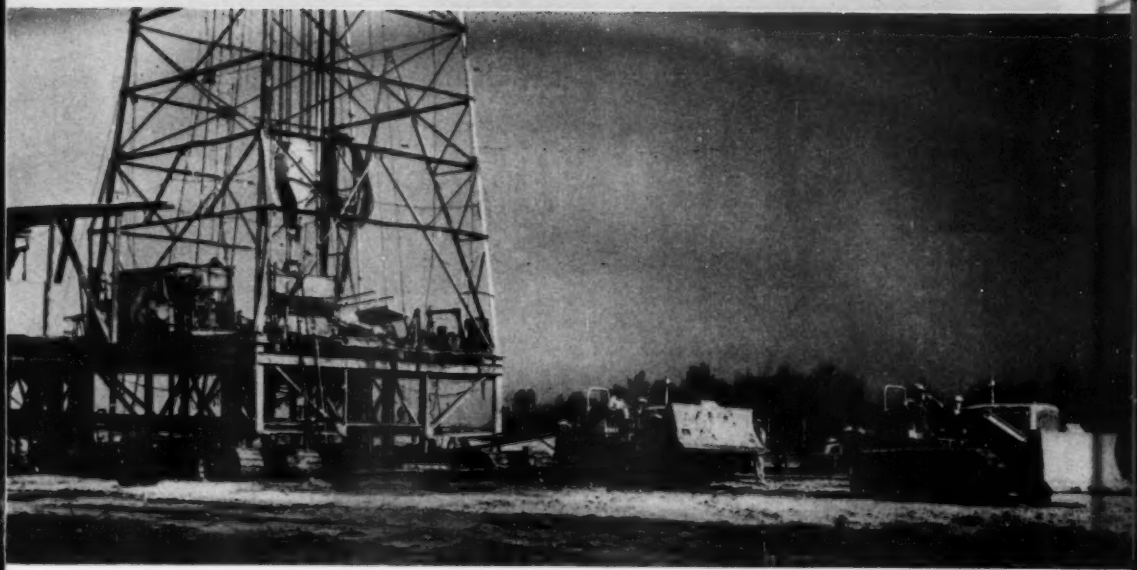
YOU GET ALL THESE ADVANTAGES!

- Gives positive bond between wall and casing because it removes mudcake by rotation.
- Cements behind the pipe regardless of its position to wall with a more equal distribution of cement.
- Staggered spikes assure a clear passage in the annular space.
- Prevents vertical migration of fluids.
- Aids in centering the casing.
- Minimizes the need for precautionary or remedial squeeze jobs.
- Saves money — only one size Halliburton Roto-Wall Cleaner is required for all casing jobs.

HALLIBURTON

YEARS AHEAD IN CEMENTING SERVICE!

moving's *faster* this way



Clark Sherwood Rig Building Company of Houston makes quick work of moves over soft ground. Using Athey double-track dollies to support the derrick and two "Cat" D7 Tractors equipped with Hyster winches to pull it, Sherwood has reduced moving time from days to hours.

"Moving the old way, we'd have to take the rig down and rebuild it," Clark Sherwood says. "That would usually eat up 8 days. This way we've moved a rig 7½ miles and completed the job in one day. 'Caterpillar' equipment is far superior to any we've ever used."

On this job in the Texas Company's South Durkee Field, Harris County, Texas, a 112-ton derrick was moved 1,500 feet in 2½ hours. The engine subbase was also moved in good time.

Production is vital to our nation's economy today. It's essential to keep the machines that speed production *on the job*. "Caterpillar" units are ruggedly built for hard work, but you can get *extra* capacity and longer life from them by taking good care of them. Just twenty minutes' maintenance attention a day may save you days of downtime. Your "Caterpillar" Dealer is nearby for service—keep in touch with him!

CATERPILLAR, PEORIA, ILLINOIS

CATERPILLAR

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DIESEL ENGINES
TRACTORS • MOTOR GRADERS
EARTHMOVING EQUIPMENT

*Overcured Sections — present every 30' to 40' in all belts made by the flat press method. Only Rotocuring (continuous, non-stop curing) eliminates this major cause of belt failures.

Here Lies a Good Conveyor Belt ...killed by OCS*

—BWH ROTOCURE prevents these fatalities — look for it in the belts you buy

Press overlaps, inherent in belts cured by flat press methods, are a primary cause of early belt failure. The overlaps result in overcured segments 2″ to 4″ wide across the entire belt because vulcanization is *not* continuous. These 2″ to 4″ segments are *double cured* — and *double curing weakens the structure!*

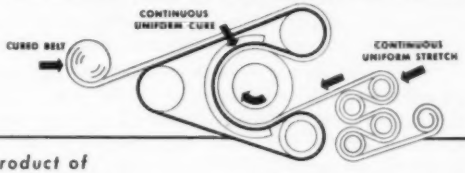
When you buy a BWH conveyor belt made by the *continuous* ROTOCURE process of vulcanization you obtain a *uniformly strong* belt *overall.* The weakened segments due to overlapping that sabotage operations and inflate belting costs are completely eliminated. With continuous, endless vulcanization you'll be ahead four ways:

1. In increased belt flex life — as much as 40%
2. In elimination of mechanical distortion at the press ends
3. In constant, uniform stretch
4. In uniform, abrasion-resistant covers

These characteristics of BWH Conveyor Belts mean minimum belt maintenance costs, longer belt life and appreciable per ton savings in the cost of what you convey! Ask your BWH distributor to show you how these highly serviceable belts can help you. Or write us direct.**

**Ask him also about BWH Rotocured Transmission Belts. Because they permit operation at lower tensions, you are assured of longest possible belt life.

DIAGRAMMATIC SKETCH OF EXCLUSIVE ROTOCURE PROCESS



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DEPENDABLE RUGGEDNESS

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Here's a blueprint FOR INCREASING SPEED AND REDUCING WORRY

In 1932, Farrel developed a series of speed increasers which has taken at least some of the worry out of pipeline pumping station operation. For, of the hundreds of units installed in the oil industry since then, ***not a single one has ever failed in service.***

In view of this exceptional twenty-year record, you can feel confident that your own worries will be reduced when you specify *Farrel speed increasers.* These units are available in 49 standard sizes, with speed ratios ranging from 1:1 to 12:1. For higher ratios, units using two sets of gears are supplied with ratio range from 12:1 to 40:1.

For further information about these service-proved speed increasers, write for your copy of Bulletin No. 448A. No cost or obligation.

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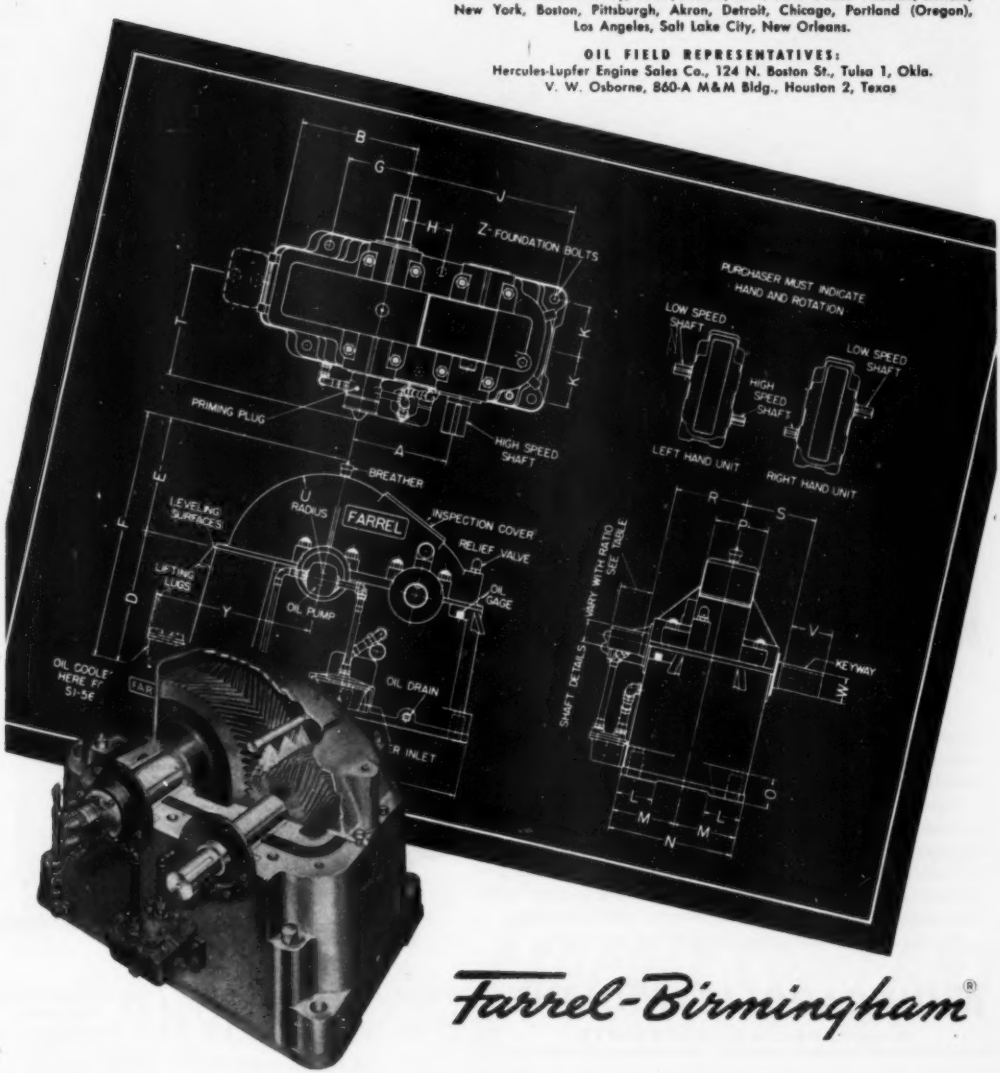
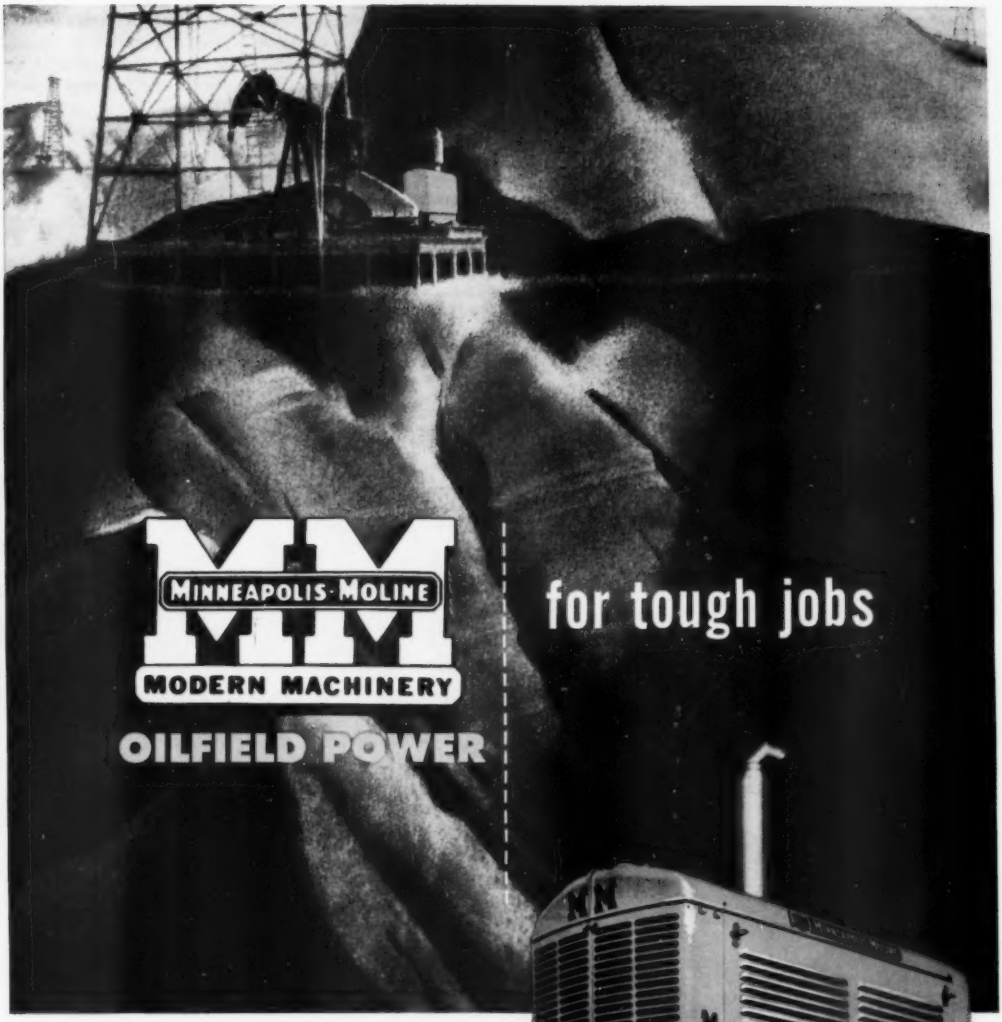
Plants: Ansonia and Derby, Conn., Buffalo, N. Y. *Sales Offices:* Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Detroit, Chicago, Portland (Oregon), Los Angeles, Salt Lake City, New Orleans.

OIL FIELD REPRESENTATIVES:
Hercules-Lupfer Engine Sales Co., 124 N. Boston St., Tulsa 1, Okla.
V. W. Osborne, 860-A M&M Bldg., Houston 2, Texas



Farrel-Birmingham®



How can this engine operate 24 hours a day for 8 to 10 years without overhaul? Here's the secret—controlled lube oil temperatures and elimination of lube oil contaminants.

Superior methods of filtration cleanse the air, fuel, lube oil and crankcase vapors. Exclusive MM water jacketted base pan maintaining 190° constant lube oil temperature eliminates sludge formation which in ordinary engines combines with dirt and grit to destroy moving parts. Heavy fine grain engine castings easily take severe shocks and strains imposed by oilfield loadings.

Result: Years of economical trouble free operation.

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MINNEAPOLIS 1, MINNESOTA

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THE Bovaird SUPPLY COMPANY

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81 YEARS OF PROGRESS WITH THE OIL INDUSTRY

Straight-from-the-shoulder facts show you save in every way with

CHEVROLET *Advance-Design* TRUCKS

FACT No. 1

COSTS LESS TO BUY

Match a Chevrolet truck against any comparable truck capable of handling the same payloads. You'll find Chevrolet trucks *list for less*, yet bring you ruggedness, stamina and great features not found in the other truck.

FACT No. 2

SAVES MONEY ON THE JOB

Experienced truck operators know Chevrolet trucks cost least to own and maintain. Valve-in-Head economy, in the Chevrolet Loadmaster or Thriftmaster engines, saves on gas. Four-way engine lubrication reduces wear and oil costs. Rugged construction means long life.

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RIGHT TRUCK FOR EVERY LOAD

Chevrolet trucks are *factory-matched* to your payload and service requirements. You don't buy "too much truck" or "too little truck." Frame, axles, springs, body, brakes and power are *balanced* for the job.

FACT No. 4

KEEPS ITS VALUE LONGER

Records show that Chevrolet trucks traditionally bring more money at resale or trade-in than many other makes. Chevrolet's market value stays up because the value stays in! More proof that Chevrolet is the best truck buy! See your Chevrolet dealer soon.

CHEVROLET ADVANCE-DESIGN TRUCK FEATURES

TWO GREAT VALVE-IN-HEAD ENGINES—Loadmaster or the Thriftmaster—to give you greater power per gallon, lower cost per load • **POWER-JET CARBURETOR**—for smooth, quick acceleration response • **DIAPHRAGM SPRING CLUTCH**—for easy-action engagement • **SYNCHRO-MESH TRANSMISSION**—for fast, smooth shifting • **HYPOID REAR AXLE**—for dependability and long life • **TORQUE-ACTION BRAKES**—on light-duty models • **PROVED DEPENDABLE DOUBLE-ARTICULATED BRAKES**—on medium-duty models • **TWIN-ACTION REAR BRAKES**—on heavy-duty models • **DUAL-SHOE PARKING BRAKE**—for greater holding ability on heavy-duty models • **CAB SEAT**—with double-deck springs for complete riding comfort • **VENTI-PANES**—for improved cab ventilation • **WIDE-BASE WHEELS**—for increased tire mileage • **BALL-TYPE STEERING**—for easier handling • **UNIT-DESIGNED BODIES**—for greater load protection • **ADVANCE-DESIGN STYLING**—for increased comfort and modern appearance.

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first in demand in value in sales

CHEVROLET

You can't argue with facts, figures, and performance. The above scene was made in a producing field near Yale, Oklahoma, which was electrified during the past year. It is operated by one of the Major Oil companies. Figures show that the average cost per day for six wells is 37c each. You can't beat that for economy's sake. Nor can you beat *PEP for safety and dependable operation. Investigate today — maybe you're losing money by not taking advantage of Electric Power. Contact the Power Engineer of your nearest Electric Power company for details on how *PEP can do a real job for you.

*PEP — Purchased Electric Power

Petroleum Electric Power Association

ORGANIZED IN THE INTEREST OF GREATER SERVICE TO THE PETROLEUM INDUSTRY

CALL YOUR NEAREST ELECTRIC SERVICE COMPANY FOR MORE FACTS

OR ADDRESS YOUR REQUEST TO P. O. BOX 2771, DALLAS, TEXAS

Whether you want one worm-gear speed reducer or a thousand, a standard drive or a unit designed to meet your special problems, Cleveland is prepared to serve you. Meeting the most difficult requirements of machinery manufacturers and users is Cleveland's everyday business.

Just off press... FREE for your asking

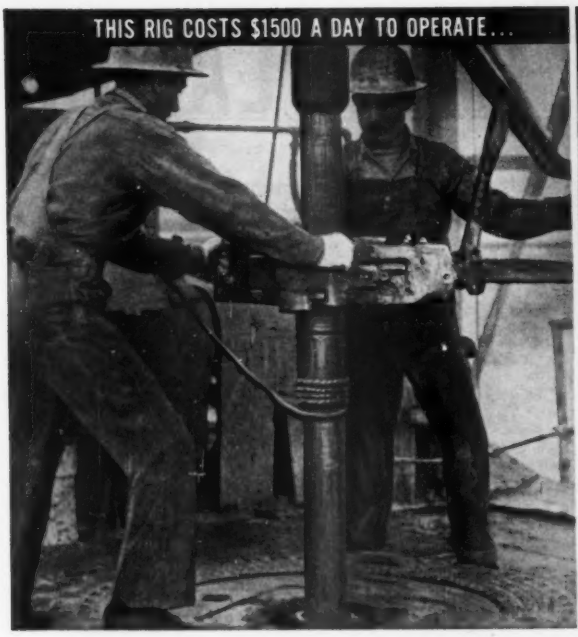
YOU'LL find first aid in this new Cleveland catalog — whenever you have to select worm gearing or an efficient worm-gear speed reducer.

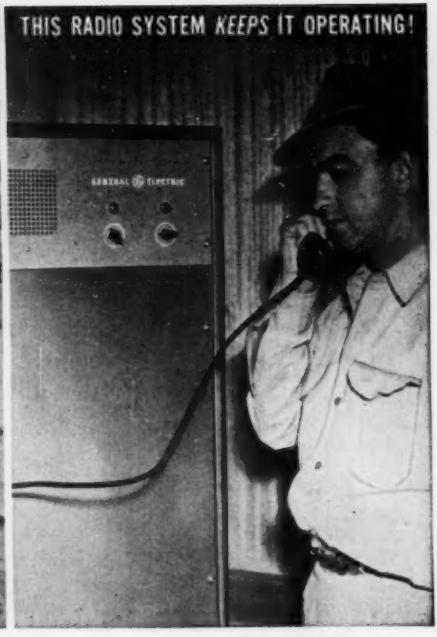
Catalog 400 replaces our old Catalog 200. Its 180 pages illustrate and describe each model in the complete line of Cleveland Worm Gear Speed Reducers. It contains engineering data on each type, including dimensions, weights and horsepower capacities—all the information you need to arrive at proper selections of drives for any equipment.

Over a year in the making, Catalog 400 is now available to all our customers. If you can use one in your work of designing power-driven equipment, or selecting speed reducers for new or old machines, just drop us a line on your letterhead.

The Cleveland Worm and Gear Co., 3286 East 80th Street, Cleveland 4, Ohio.

Affiliate: The Farval Corporation, Centralized Systems of Lubrication. In Canada: Peacock Brothers Limited.





G-E 2-WAY RADIO PAYS FOR ITSELF *in 2 hours*

FOR exploratory drilling deep in the Louisiana bayous and along the tidewater ledge, the Richardson & Bass Drilling Company employs one of the largest rigs in the oil business. With operating costs of this facility at approximately $1500 a day, shutdowns must be kept to a minimum.

● Dependable General Electric 2-way radio units aboard the barge *Keystone* and at shore points keep crews and field offices in constant communication over distances up to 40 miles. In the swamps or over the Gulf, voice messages speed supplies, transmit drilling and weather reports, keep the job rolling. Cost of the G-E equipment is low. One unit *pays for itself when it saves as little as 2 hours shutdown time.*

● General Electric's Communications Advisory Service is in action throughout the oil and gas industry. It saves time and money for explorers, drillers, producers, well servicers, pipeline builders and operators. Ask the General Electric Communications Man at our office near you for complete information. Meanwhile, the coupon below will bring you literature on this subject.

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Please mail me latest bulletins on G-E 2-way radio equipment for industry.

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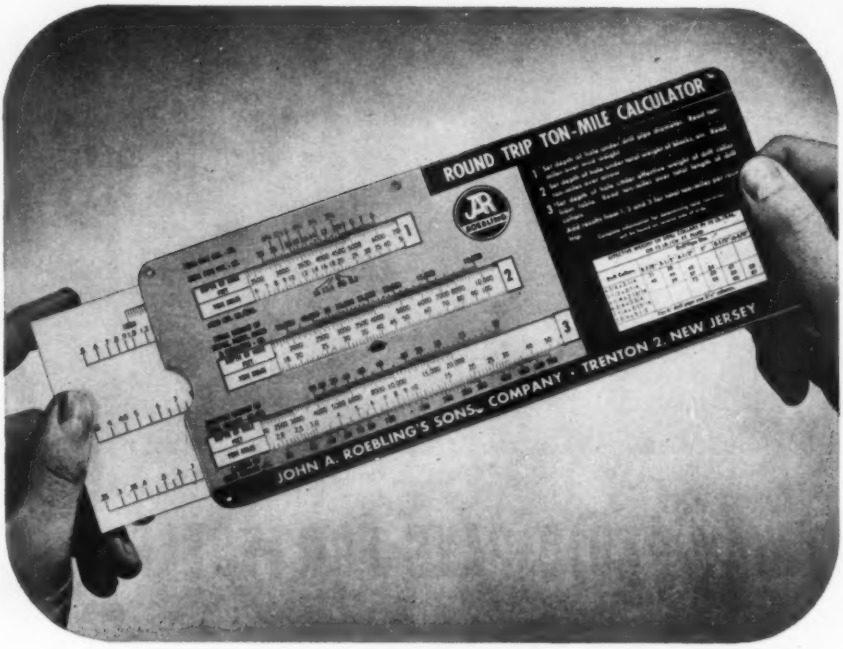
TON-MILE CALCULATOR



Now, in seconds, you can figure your ton-miles with the new Roebling Calculator!

1, 2, 3 SETTINGS and simple addition give you an accurate ton-mile reading with the Roebling Round Trip Ton-Mile Calculator. It uses a complete range of hole depths, pipe diameters, mud weights, etc. It's sturdy and just the right size for your pocket, too.

It's offered to you by the makers of Roebling "Blue Center" Steel Wire Rope . . . the rope that saves you time and cuts your costs because it stands up when the going gets tough.

Call in your Roebling Field Man for the right rope for top service. District offices at Cleveland, Denver, Houston, Los Angeles, Odessa and Tulsa. And write us for your Round Trip Ton-Mile Calculator. John A. Roebling's Sons Company, Trenton 2, N. J.

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CHAPMAN
Tilting Disc CHECK VALVES

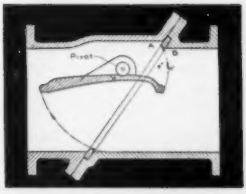
Typical test on a 22-inch Chapman Tilting Disc Check Valve under 450 pounds gas pressure . . . carrying 3,200,000 feet of gas per hour . . . showed a drop in pressure of less than 7 inches of water.

The average reduction of head loss . . . as against conventional check valves . . . is 65% to 80%.

That's because the balanced hinge-pinned disc, of special aerofoil design, has exceptional lifting qualities, lightness in unbalanced weight, and minimum resistance to flow in open position. And valve body is streamlined, with through-way always equal to the area of the pipe.

This means that *disc won't slam* under usual piping arrangements ...and that it seats drop-tight. It means, too, that many new lines can be designed in smaller size. Send for Catalog No. 30, giving complete data and test-curves on Chapman Tilting Disc Check Valves.

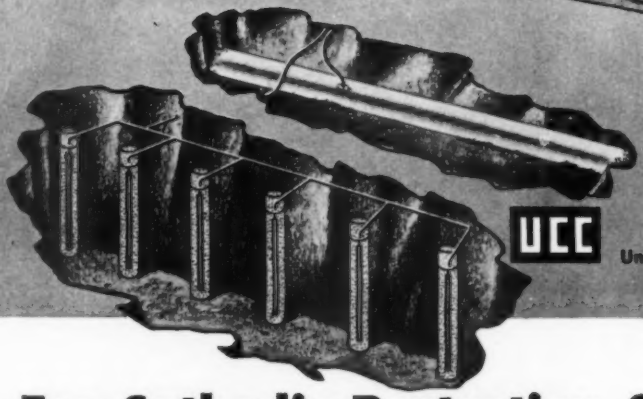
THE CHAPMAN VALVE MFG. CO.
INDIAN ORCHARD, MASSACHUSETTS



Cross-section of the Chapman Tilting-Disc Check Valve illustrating the way that the balanced disc is supported on the pivot, with arrows showing the travel of the disc. A feature of the design is that the disc seat lifts away from the body seat when opening, and drops into contact when closing, with no sliding or wearing of the seats.

SELENIUM RECTIFIERS and ELECTRODES

GENERAL ELECTRIC



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Union Carbide and Carbon Corp.

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Hermetically-sealed General Electric selenium rectifiers are available in a complete range of types to meet requirements of any specific application.

Units have a power factor of 98% and an operating efficiency of from 60 to 65%. They are designed for wall or pole mounting and feature conduit knockouts . . . DC output terminal connectors . . . thermal magnetic circuit breakers . . . easily-read indicator type ammeter and volt meter . . . ready accessibility for inspection . . . and long lasting finish.

Three grades of "National" ground electrodes are available to meet the demands of almost every cathodic protection application:

Graphite electrodes are especially resistant to electrochemical oxidation.

Na Graphite electrodes, impregnated to eliminate porosity, are recommended for salt environments or salt water applications.

Carbon electrodes have been developed for application when bromides or fluorides are present. Electrodes are available in complete range of sizes and shapes.

HARCO CORPORATION offers a complete Engineering and Contracting Service for the installation of Cathodic Protection Systems. Because the problems of each installation vary according to soil, seasonal and atmospheric conditions, Cathodic Protection Systems should be job-engineered for maximum effectiveness against corrosion.

290-HC

Write today for catalogs describing rectifiers, electrodes and Harco service.

THE Harco CORPORATION Cathodic Protection Division

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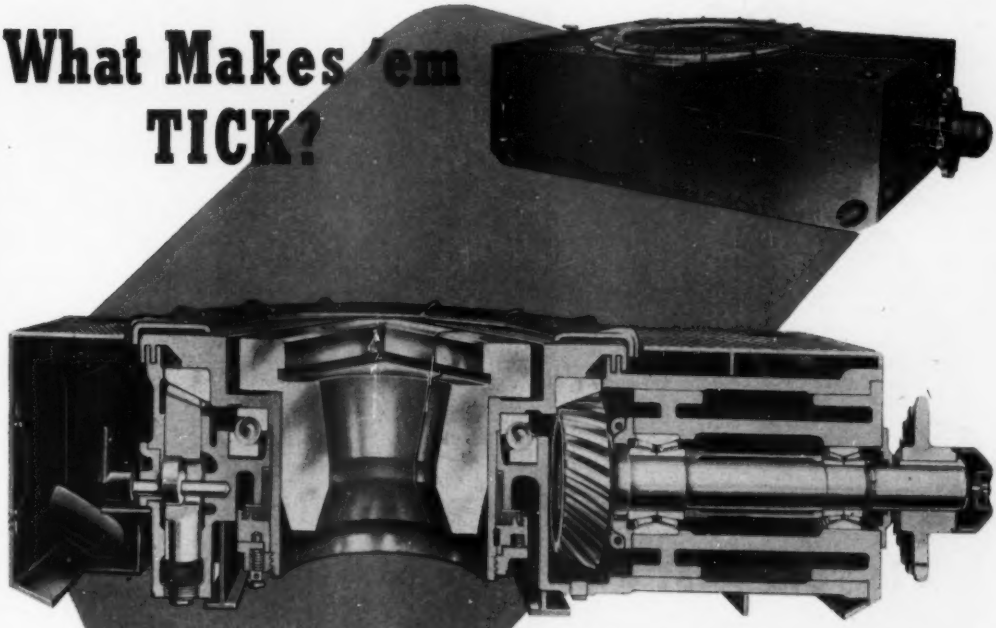
WHELAND ROTARIES

What Makes 'em TICK?



We do not believe it possible to investigate Wheland Rotaries without respecting the remarkable efficiency and economy they afford.

We have noticed that the most exacting men in the drilling industry are snowballing Wheland popularity.

For carefully prepared data on this subject, ask at your near-by Jones & Laughlin Supply store or write us at Tulsa.

AMERICA NEEDS SCRAP TO MAKE MORE STEEL

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84 STORES • 18 OFFICES • 8 RESIDENT SALESMEN

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J&L STEEL

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FLOYD KISLER, *one of Independent's younger Party Chiefs, has had 8½ years of continuous geophysical experience. He came to Independent from the Louisiana State University, and worked as a computor and on other key jobs with field crews before becoming Party Chief.*

In Geophysical Work EXPERIENCE is your best assurance of SUCCESS

The record of results achieved during more than 20 years of service to many important oil producers is your assurance of satisfactory returns on your investment in an Independent geophysical survey. Founded in 1932, Independent is one of the oldest exploration contractors in the world operating continuously under the same ownership and management.

Your inquiries are invited.

POINTING THE WAY IXC FOR THE DRILL

Independent *Geophysical Surveys*

EXPLORATION COMPANY

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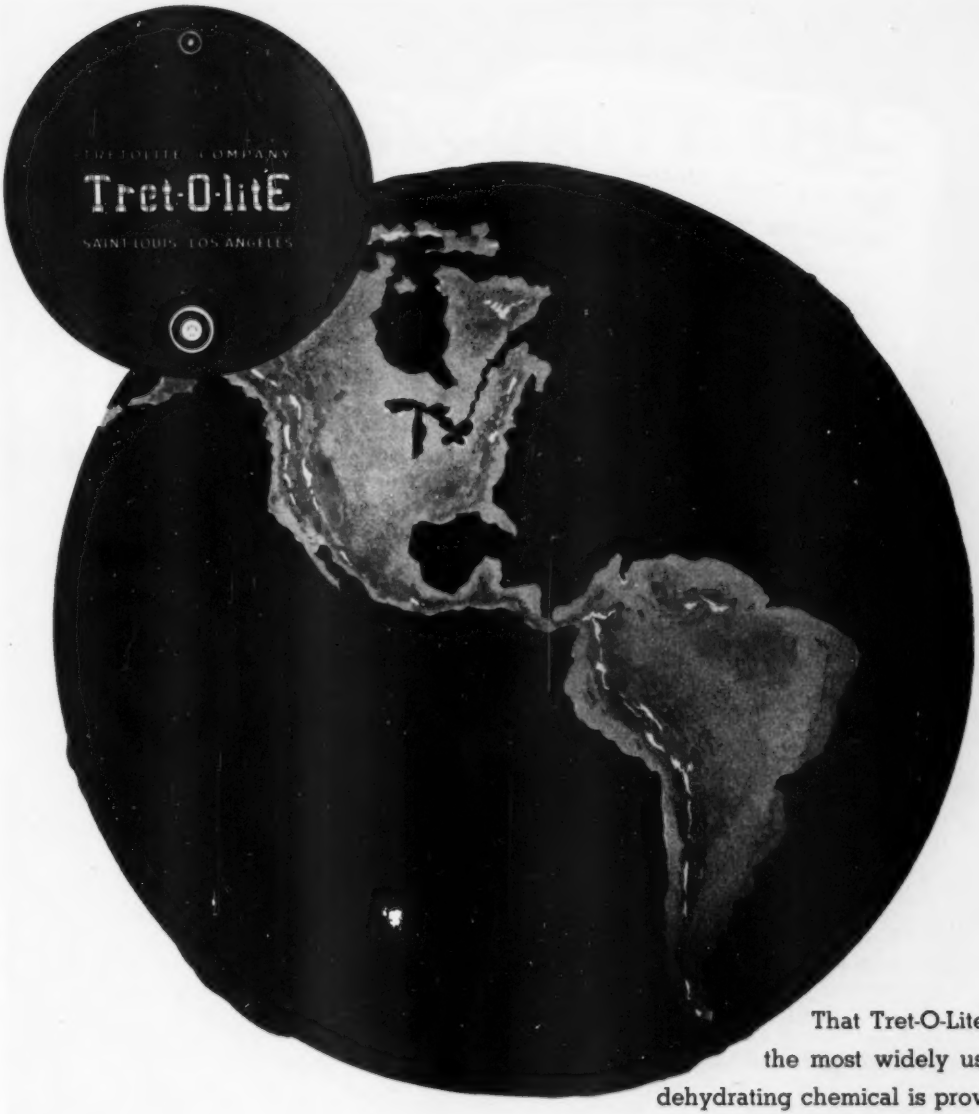
ESTABLISHED 1932



That Tret-O-Lite is the most widely used dehydrating chemical is proved daily in oil fields all over North and South America. Let the Tretolite field engineer in your field show you how Tret-O-lite has earned this world-wide recognition.

T 52-3

TRETOLITE COMPANY
SAINT LOUIS 19, MISSOURI • LOS ANGELES 22, CALIF.

Chemicals for the Petroleum Industry

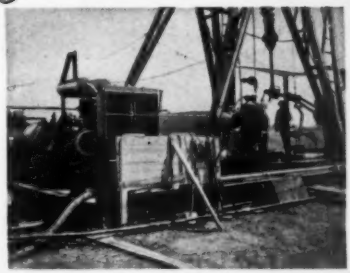
DEHYDRATING • DESALTING • WATER DE-OILING
CORROSION INHIBITING • SCALE PREVENTING • PARAFFIN REMOVING

GM Diesel
Case History No. 517-28

USER: T. M. Pruett, Centralia, Ill.

INSTALLATION: Two GM "Twin 6" Diesels, installed January, 1949, powering Unit U15 Drawworks and an A10 Emsco triplex mud pump.

PERFORMANCE: Owner reports this rig completed a round trip at 3,800 feet in 1 hour and 15 minutes, setting back doubles. It drilled 4,000 feet in 14 days through McCluskey, Devonian and Trenton formations (a good record for rigs in this area). In Frogtown area rig drilled 2,200 feet to Devonian in 4 days, 6 hours.

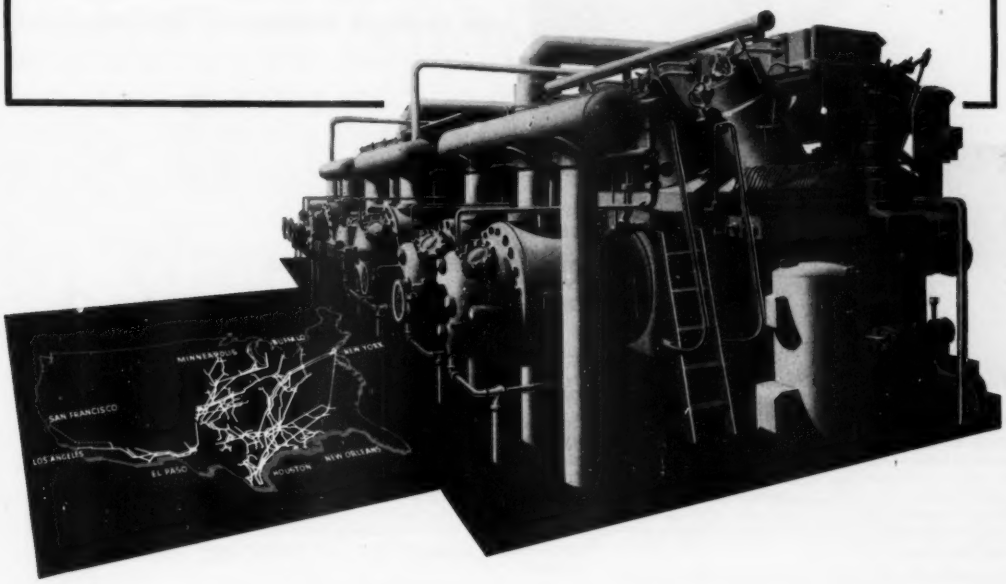


This Diesel made 3800-foot round trip in 75 minutes

GM
GENERAL MOTORS
DIESEL POWER

GULF SECURITY OIL

provides better lubrication
for pipe line compressor units,
helps prevent operating troubles



Here's the lubricant you can depend on to help keep your pumping stations operating smoothly and continuously—Gulf Security Oil. It provides effective protection for cylinders and bearings in both engines and compressors.

Because of its excellent resistance to oxidation, Gulf Security Oil stands up for many hundreds of hours without any appreciable change in its original properties. After years of operation with this quality lubricant, equipment shows remarkable freedom from cylinder wear and a minimum of carbon deposits on valves and rings. And because oil control rings are kept clean, oil consumption is remarkably low.

Operators of the many units lubricated with Gulf Security Oil report that this quality lubricant helps them get more operating hours between overhauls, and avoid unscheduled shutdowns.

For additional information on Gulf Security Oil and for the services of a Gulf Lubrication Engineer, get in touch with your nearest Gulf office today. Write, wire, or phone.

Gulf Oil Corporation · Gulf Refining Company,
Gulf Building, Pittsburgh 30, Pennsylvania.

GULF INDUSTRIAL LUBRICATION

"I MUST KNOW EXACT TEMPERATURES TO MAINTAIN PRODUCT QUALITY."

"THE SAFETY OF MY EQUIPMENT DEPENDS ON ACCURATE TEMPERATURE MEASUREMENT."

"IN MY BUSINESS, PRECISE TEMPERATURE RECORDING MEANS PRECISE COST CONTROL."

You know why accurate temperature measurement is vital in *your* business. You also know it takes skillful engineering, the highest quality materials and workmanship to create consistently accurate, long-life instruments. That's exactly what you get in every American Thermometer and Temperature Indicator and Recorder you buy.

Depending upon type and requirements, these precision instruments are built in ranges from minus 100°F. to plus 3000°F., with actuation by mercury, vapor pressure, gas, bi-metal or thermocouple. For accurate remote indication or recording, up to 250 feet from the temperature source, we can supply famous "Magic Pulse" self-compensating capillary tubing with mercury-actuated temperature instruments. American Temperature Transmission systems are ideal wherever process temperatures must be indicated or recorded at one or more points located at considerable distance from the temperature source.

The complete line of American Thermometers and Temperature Measuring Instruments simplifies selection for specific applications. Write for a copy of our new catalog.

Stocked and Sold by Leading Distributors

AMERICAN INDUSTRIAL GLASS THERMOMETERS

AMERICAN ELECTRONIC TEMPERATURE INDICATORS

AMERICAN RECORDING THERMOMETERS

AMERICAN DIAL THERMOMETERS

1850 AMERICAN U.S.A.

AMERICAN INDUSTRIAL INSTRUMENTS

MAXWELL MANNING MM TRADE MARK

A product of **MANNING, MAXWELL & MOORE, INC.** STRATFORD, CONNECTICUT

MAKERS OF 'AMERICAN' INDUSTRIAL INSTRUMENTS, 'HANCOCK' VALVES, 'ASHCROFT' GAUGES, 'CONSOLIDATED' SAFETY AND RELIEF VALVES. BUILDERS OF "SHAW-BOX" CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES.

Eaton 2-Speeds are designed and built to stay on the job

THESE EXCLUSIVE Eaton features are the reason why: planetary gearing distributes pressure and wear over a number of small gears, resulting in lower unit stress; forced-feed oiling system provides positive lubrication to all moving axle parts at even slowest vehicle speeds; extra heavy construction eliminates the possibility of distortion or misalignment under excessive loads. These three features add up to longer parts life, outstanding dependability, minimum time in the shop and low maintenance cost. Let your dealer explain how Eaton 2-Speeds will help your trucks haul more, faster, longer, at lower over-all cost.

EATON

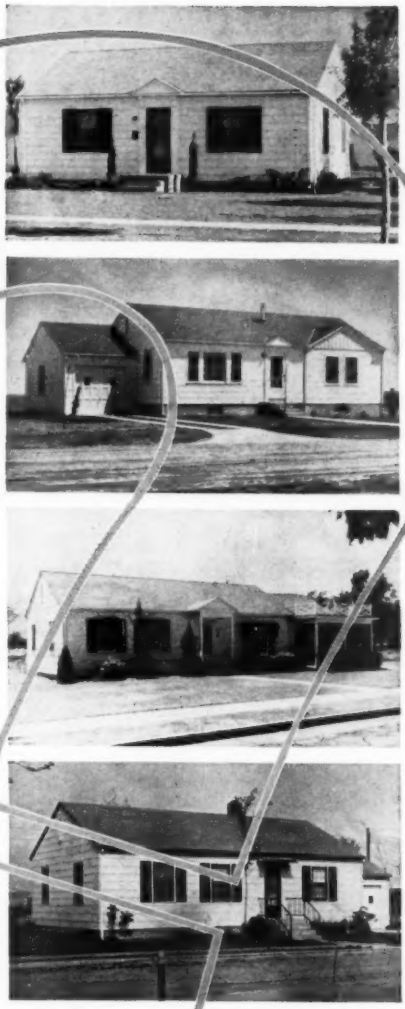
2-Speed Truck

AXLES

Axle Division
EATON MANUFACTURING COMPANY
CLEVELAND, OHIO

PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

WHICH HOUSE IS NOT PREFABRICATED?



This is a fooler. ALL the houses here are prefabricated. In fact they are all standard STURDYBILT designs now in use in oil fields in many parts of the country.

Users of STURDYBILT Prefabricated, Demountable Houses know they get *all* the features of conventional houses, plus many other advantages.

STURDYBILT Houses are attractive, comfortable and weather tight. At the same time, they can be easily transported and erected anywhere a truck can go. They can also be "knocked down" and moved to a new location with practically no loss of material.

Specify STURDYBILT Prefabricated Houses for all your field housing needs.

MANUFACTURERS OF SPECIAL WOODWORK: DISTRIBUTORS OF JOHNS-MANVILLE BUILDING MATERIALS; CURTIS WOODWORK

STURDYBILT

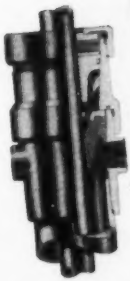
PREFABRICATED, DEMOUNTABLE HOUSES

SOUTHERN MILL & MANUFACTURING CO. • TULSA, OKLAHOMA

phmi PREFABRICATED HOME MANUFACTURERS' INSTITUTE

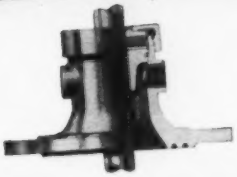
STURDYBILT HOUSES COMPLY WITH COMMERCIAL STANDARD CS125 OF THE NATIONAL BUREAU OF STANDARDS FOR PREFABRICATED HOMES

RECTORHEAD Type R Casing and Tubing Heads meet ALL Low-Pressure Producing Conditions

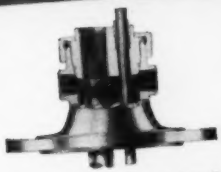


Threaded bottom Type R Tubing Head with slips and stripper. For workover jobs a second stripper can be used in place of slips in adapter bowl. Slips and stripper are interchangeable in head and bowl.

Type R Casing Head with threaded connection. Notice how ribbed construction of slips permits full flow to side outlets; also simplicity and effectiveness of sealing arrangement.



Type R Tubing Head with light flange for use on flanged casing head . . . or when replacing high pressure tubing head and tree when changing from flowing to pumping conditions.



The original tubing head installation can be adapted to Kobe Pump by using special threaded mandrel with stuffing box for power lines. The mandrel, resting on ground joint seat, has an "O" ring seal.

● Extremely adaptable, these low cost, low-pressure, forged steel casing and tubing heads are your most practical and efficient answer to a wide range of producing conditions. They are the safe, economical, easily installed heads for low-pressure wells. The tubing head with flanged bottom can be used when changing from flowing to pumping conditions. Flange has standard API ring groove and bolting arrangement.

Slip bowl adapter is available to carry slips, packing and gland so strippers can be used in head body. Strippers and slips are interchangeable.

Both heads have the same sealing arrangement . . . an oil-resistant pack-off that is forced into sealing position around pipe and head body by a split packing gland. On the casing head this gland is tightened down by six stud bolts . . . on the tubing head by a cap threaded to the body. Slips are case hardened, three segment type with ribbed construction to allow full flow to side outlets.

If you are getting ready to finish a low-pressure well or change from flowing to pumping, ask your Rector Representative or authorized supply store for complete details about Rector Type R Casing and Tubing Heads.

RECTOR WELL EQUIPMENT COMPANY INC

★ MAKING THE OIL INDUSTRY SAFER ★

1100 NORTH COMMERCE ST. FORT WORTH, TEXAS

Houston Plant: 2215 Commerce St.

REPRESENTATIVES IN ALL ACTIVE FIELDS

ASSOCIATION OF WELL HEAD MANUFACTURERS CERTIFIED

RECTORHEAD RECTOR FULBORE CEMENTING METHOD RECTORSEAL

P&H DIESEL ENGINES

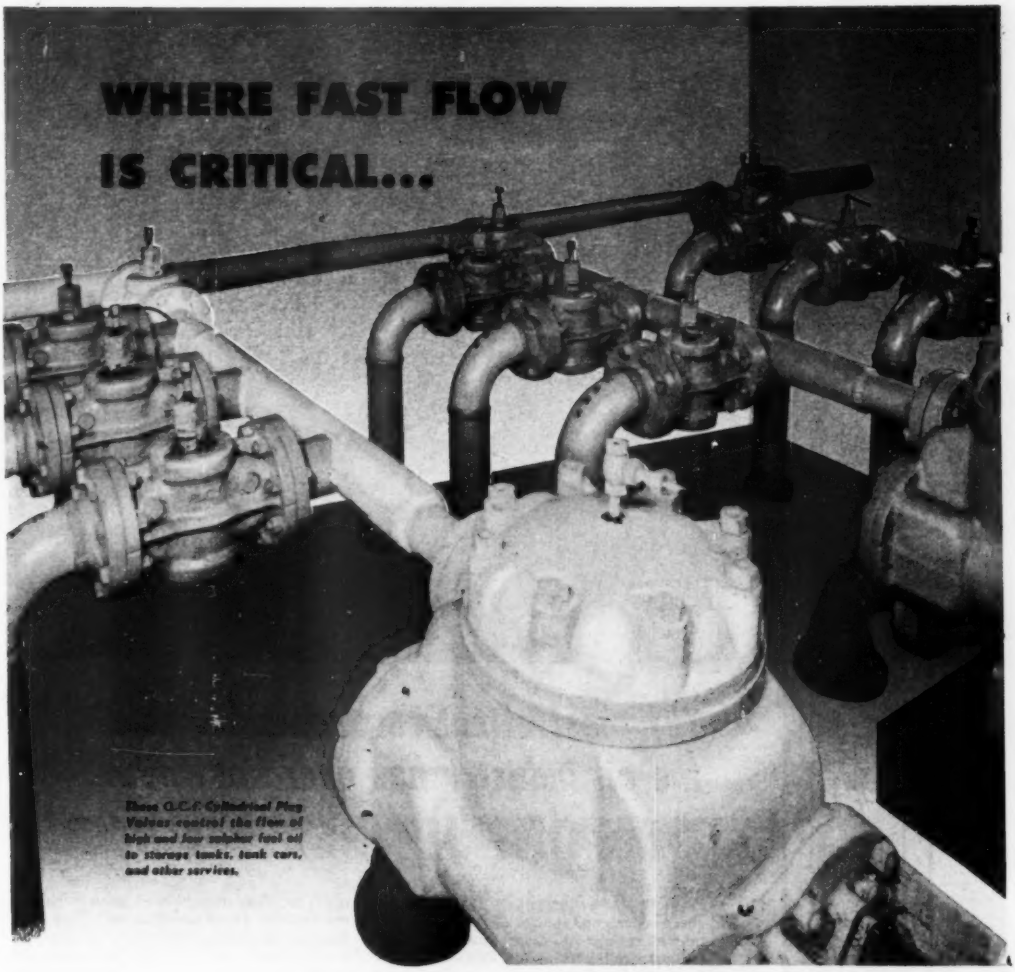
2-CYCLE

SHOCK LOADS

EVERY 30 SECONDS

That's normal operation for power shovels—the toughest assignment known for diesel engines. It's the service P&H Diesels were designed to take. Years of superior performance, attested by hundreds of users, prove that P&H Diesels can take *any* of your toughest jobs in stride. It's one reason wise users are standardizing on P&H Diesels. There are many other reasons worth learning. For literature, write Diesel Division, Harnischfeger Corporation, Crystal Lake, Illinois.

P&H DIESEL DIVISION
HARNISCHFEGER
CRYSTAL LAKE ILLINOIS, U.S.A.

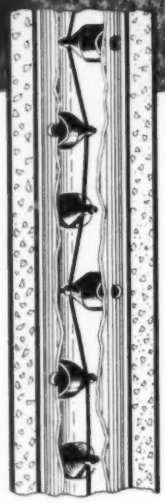

WHERE FAST FLOW
IS CRITICAL...
These A.C.F. Cylindrical Plug Valves control the flow of high and low sulphur fuel oil to storage tanks, tank cars, and other services.

There are many times when it is important to get a batch of lading moved a few minutes faster... and there is where a.C.f. full pipe area CYLINDRICAL PLUG VALVES fit in. There is no throttling effect, for the passage through the valve has at least as much area as the passage through the pipe itself. Faster... and easier on the pumps.

a.C.f. CYLINDRICAL FULL PIPE AREA **PLUG VALVES**

Representatives in more than 50 principal cities

Want literature? Ask for Catalog 4-OG, American Car and Foundry Company, Valve Division, 1501 East Ferry Avenue, Detroit 11.



The most effective perforating tool the oil industry has ever known . . .

DU PONT JET PERFORATORS!

Du Pont Jet Perforators are high-explosive charges designed specifically to cut through oil-well casings and sheath and to penetrate the surrounding formation. Precision manufacture and quality control by Du Pont make them the most efficient means of perforating yet developed . . . assure uniform action and predictable results in the field.

Easy to work with

"Jets" are loaded in leak-proof carriers ready to lower into the well upon arrival at the job site (note sketch at left). This preloading speeds operations by reducing rig time as much as 50%. And since one or more carriers can be fired simultaneously, symmetrical patterns are assured.

Perforate to maximum depth

Du Pont Jet Perforators consist of a plastic shell containing an explosive shaped charge with a conical copper lining. They produce a jet of tremendous power which readily perforates one, two or three strings of casings. They leave no obstructions in the casing to interfere with lowering of tools through the perforated zone. And they maintain maximum performance with well temperatures up to 350°F.

Bulletin tells how they work

It's to your advantage to have your service company use Du Pont Jet Perforators on your next job. Write now for your copy of informative bulletin describing the action of Du Pont Jet Perforators. E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Delaware.

DU PONT EXPLOSIVES

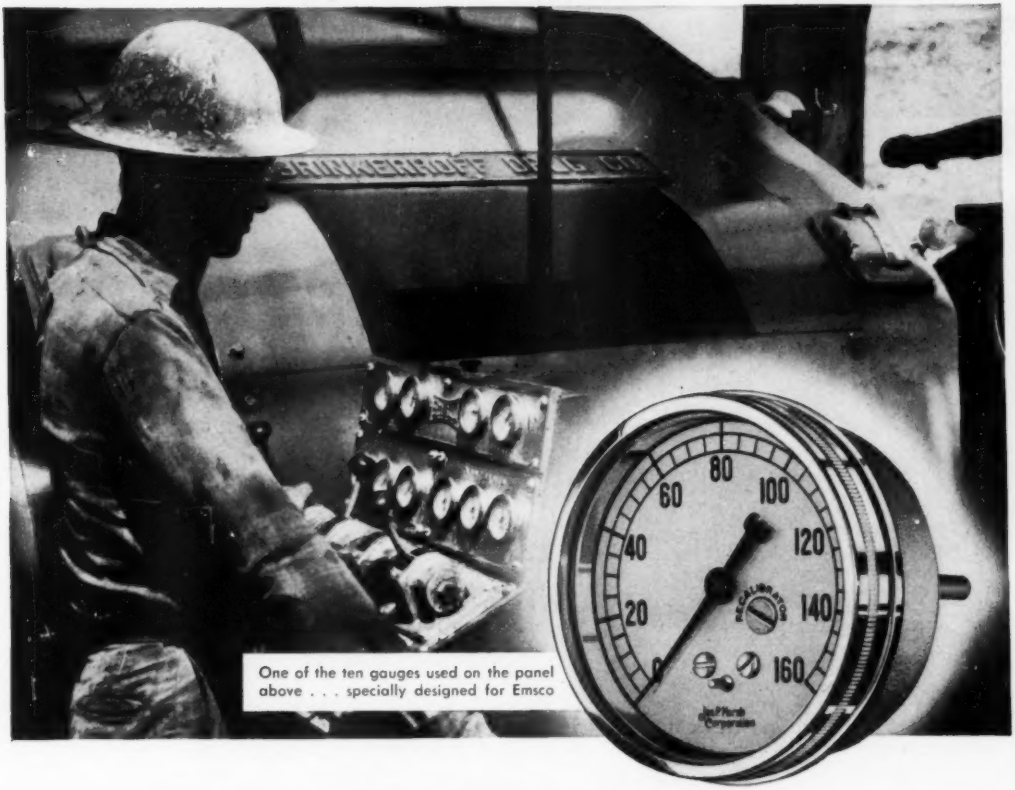
BLASTING SUPPLIES AND ACCESSORIES

DU PONT

REG. U.S. PAT. OFF.

150th Anniversary

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*



VITAL JOB FOR GAUGES

...only the best can measure up to it

That panel board is the nerve center of the rig . . . and those ten pressure gauges actually guide every move of the operator. This is no place to take chances on instruments of questionable quality; so the manufacturer of the rig—Emsco Derrick & Equipment Co. —has chosen the gauges that have proved worthy of this kind of trust . . . Marsh Gauges.

The choice of Marsh instruments by manufacturers of highest quality equipment in which pressure indication plays a vital part, is a familiar story. And the reason for this preference is equally familiar to everyone who has rubbed elbows with those dependable Marsh Gauges that are doing their job so supremely well wherever oil flows.

Marsh Gauges have been accorded top preference in the petroleum industry because they have set new standards all their own. Ask your supply house for facts or write for bulletins.

MARSH INSTRUMENT CO. *Sales affiliate of Jas. P. Marsh Corporation* **Dept. L, Skokie, Ill.**
HOUSTON BRANCH PLANT: 1121 Rothwell St., Sect. 15, Houston, Texas

MARSH GAUGES

AXELSON sucker rods

Axelson has manufactured for the Petroleum Industry since 1892 and has pioneered the scientific development of petroleum pumping equipment. Take sucker rods, for example . . .

AXELSON WAS

first **to use vanishing threads**

first **to study and improve the curve of the upset ends into the body of the rod**

first **to use nickel-molybdenum steel**

first **to normalize and temper the rods throughout their entire length**

Today, this policy of constant technical research, even more intense, assures highest standards of quality in scientific design, on long lived materials and precision craftsmanship—and is the answer to why it is . . .

AXELSON *Chosen first . . . TO LAST!*

PETROLEUM PUMPING EQUIPMENT

OUR 60th YEAR

THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

AXELSON MANUFACTURING CO.
OFFICES — New York City 7, New York
Tulsa 1, Oklahoma
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PLANTS — Los Angeles 58, California; St. Louis 16, Missouri. DISTRIBUTORS — Jones & Laughlin Supply Co.; Great Northern Tool & Supply Co.; Industrial Agencies, Ltd., San Fernando, Trinidad, B. W. I.; Industrias Waldrip & Campbell, Barcelona, Caracas and Maracaibo, Venezuela; South American Supply Co., Ltd., Lima, Peru; Sociedad Comercial de Materias Primas Limitado, Rio de Janeiro, Brazil; G. Saavedra e Hijos, S. de R. L. Avenida Morelos 31, Mexico, D. F.; Dominion Oil Field Supply Co., Ltd., Calgary, Can.

in WIRE ROPE, too it takes the RIGHT KIND of muscle

The long flat muscles of the black panther give him the spring and suppleness he needs to survive in his particular environment. They're ideal for the job they're called upon to perform.

So, too, with wire rope! Specific jobs call for the right kind of muscle; the right construction and lay of the rope; the right grade of steel and size of wire...to best withstand the destructive forces encountered.

Wickwire Rope gives you the benefit of long experience and specialized know-how which assures you of exactly the right kind of rope your particular job demands.

For additional information write or phone our nearest sales office.

THE COLORADO FUEL & IRON CORPORATION—Abilene (Tex.) • Denver • Houston • Odessa (Tex.) • Phoenix • Salt Lake City • Tulsa
THE CALIFORNIA WIRE CLOTH CORPORATION—Los Angeles • Oakland • Portland • San Francisco • Seattle • Spokane
WICKWIRE SPENCER STEEL DIVISION—Boston • Buffalo • Chattanooga • Chicago • Detroit • Emlenton (Pa.) • New York • Philadelphia

LOOK FOR
THE YELLOW TRIANGLE
ON THE REEL

WICKWIRE ROPE

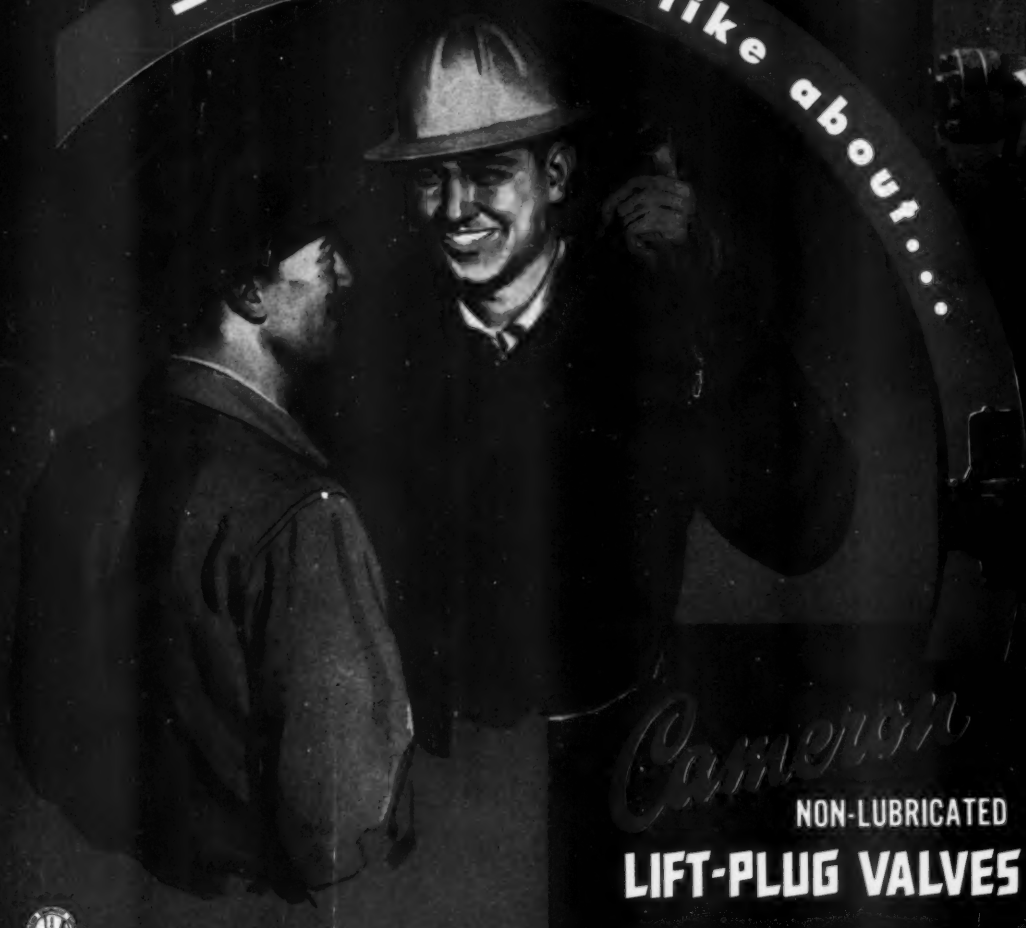
CF&I

PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL & IRON CORPORATION

Set 'em and

NO LUBRICATION MAINTENANCE

— that's what I like about . . .



Cameron

NON-LUBRICATED

LIFT-PLUG VALVES

BASICALLY BETTER

7 WAYS

1 NON-LUBRICATED—no grease of any kind required to effect a seal; prevents contamination of line products and clogging of metering equipment; reduces chance for human error and need of maintenance.

2 PRESSURE SEALING—when plug is seated, line pressure automatically forces seat into tighter engagement with plug—body distortions do not affect the seal.

3 UNIQUE LIFT-PLUG ACTUATOR—a novel mechanical design which lifts, turns and reseats plug in continuous turn of a lever.

4 RENEWABLE SEAT AND PLUG—easily replaced; permits any desired trim for specific services.

5 REPAIRS ON THE JOB—can be completely overhauled without removal from line; no special tools or skill required.

6 EASY OPERATION—requires less operating effort, than other valve designs.

7 FORGED STEEL—all parts, including body for many sizes, are press or drop forged from specification materials.

Unique lift-plug actuator lifts, turns and seats plug in ¼-turn of operating lever.

Renewable seat permits any desired trim, simplifies repairs without removing valve from service.

REGARDLESS OF SIZE . . . they must have *Dimensional Accuracy*

This photographic fantasy is simply to emphasize the excep-
tional dimensional accuracy and uniformity of Midwest Welding
Fittings that save time in welding and reduces piping costs.

MIDWEST
PIPING & SUPPLY CO., Inc.

Main Office: 1450 South Second Street, St. Louis 4, Mo.
Plants: St. Louis, Passaic, Los Angeles and Boston
Sales Offices: New York 7—30 Church St. • Chicago 3—79 West Monroe St.
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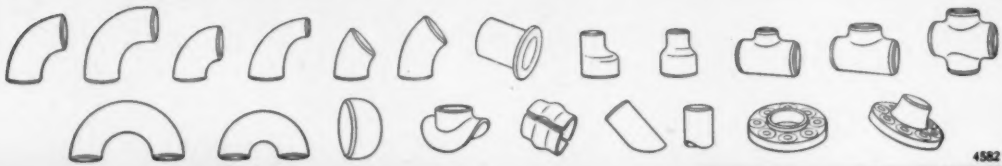
STOCKING DISTRIBUTORS IN PRINCIPAL CITIES

MIDWEST WELDING FITTINGS IMPROVE PIPING DESIGN AND REDUCE COSTS

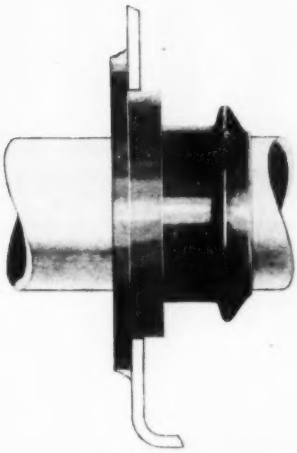


4582

...simplifies mud tank installatio
....speeds up mud line connectio

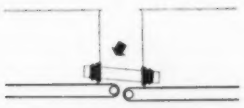
PB flexline

mud tank connector

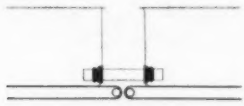


is the fastest tank connector known because...IT USES PLAIN END PIPE

- it eliminates the necessity for exact "spotting" of steel tanks —plain end pipe can extend into tank as far as needed.
- perfect alignment is unnecessary— extreme flexibility allows as much as ten degrees misalignment without leakage.
- there are no outside connections to damage or break off— no nuts and bolts to be lost on moving.
- a costly suction hose between pump and tank is eliminated.
- the replaceable self-sealing sleeves of the connector can be installed by one man in a few minutes time.



NO LEVELING—no "spotting." Tanks do not have to be spotted the same distance apart on each location—plain end pipe can extend into tank as far as necessary.



NO STRAIN ON TANKS. Flexline Connector eliminates strain on tank ends caused by settling of either or both tanks—
...flexible packing element permits angular variations as high as ten degrees.

PB's new Flex-Line Connector consists of a steel flange welded to the mud tank. The molded rubber packing element is placed in position—the retainer ring put in the recess and the connector installation is complete. No tools are needed—installation is quick, simple, and inexpensive.

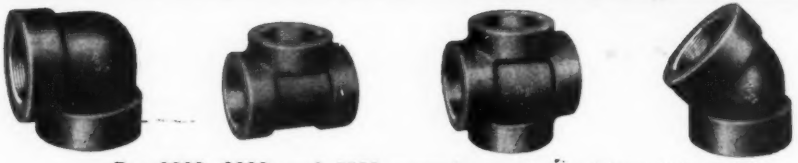
Your Protection is our Business

Available through your supply store

PB DIVISION
PB
OIL FIELD & INDUSTRIAL SPECIALTIES
Byron Jackson Co.

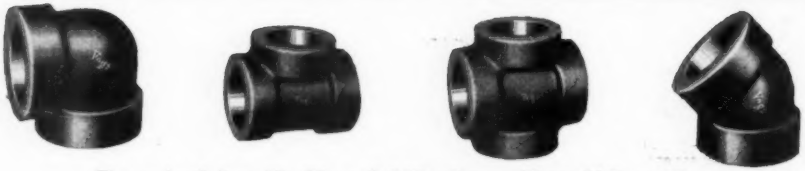
STRENGTH

for Safety and Long-Time Service



For 2000, 3000 and 6000 pounds service — Sizes 1/8" to 6"

SCREW END TYPE



For schedules 40, 80 and 160 pipe — Sizes 1/8" to 4"

SOCKET WELD TYPE

Vogt Ells, Tees, Crosses, etc., are forged from carbon steel or various alloys to meet specific operating conditions. Catalog F-9 will aid you in their selection and proper application.

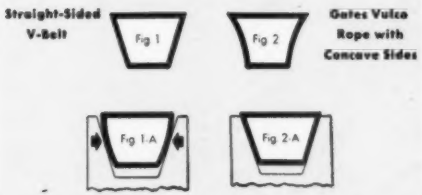
Shocks and stresses imposed by high pressures and high temperatures are taken in their stride because Vogt fittings are uniform in structure, fine grained, and free from porosity . . . the superior product of laboratory controlled materials and giant forging hammers and upsetters. These properties also give higher resistance to erosive and corrosive conditions, thereby adding to service life expectancy in steam plants, petroleum refineries, chemical plants and related industries.

HENRY VOGT MACHINE CO., INC.
Louisville 10, Kentucky
BRANCH OFFICES: NEW YORK • PHILADELPHIA • CLEVELAND • CHICAGO • DALLAS

Vogt — DROP FORGED STEEL FITTINGS

Here is *Exactly WHY* a V-Belt with CONCAVE SIDES Gives You *Longer Wear!*

What Happens When a V-Belt Bends



How Straight-Sided V-Belt Bulges in Sheave-Groove. Sides Press Unevenly Against V-Pulley Causing Extra Wear At Point Shown by Arrows.

The Concave Sides Fill Out to a Precise Fit in the Sheave Groove. No Side Bulge! Sides Press Evenly Against the V-Pulley — Uniform Wear — Longer Life!

To see for yourself how a V-Belt that has *concave sides* is certain to give longer wear, just make this simple test:—

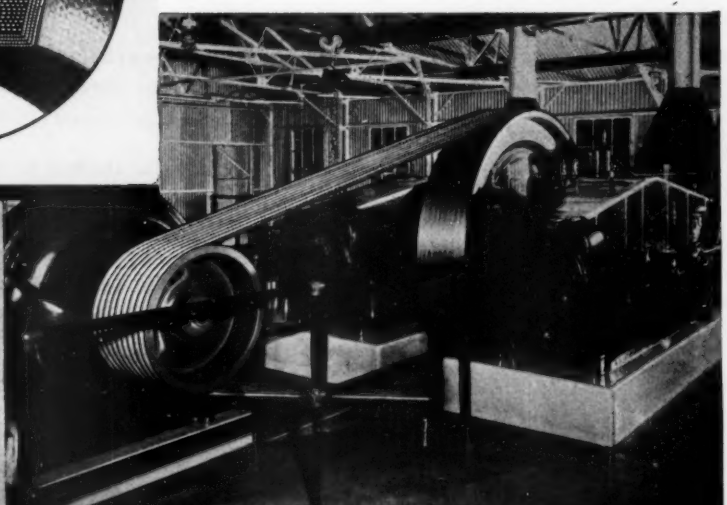
Pick up any V-Belt you have at hand. Bend that belt as it bends around a pulley. As it bends, grip its sides between your fingers. Here is what will happen *everytime*.

If the V-Belt you are testing has *straight sides*, you can feel those sides *bulge out* as the belt bends. This out-bulge forces the sides of the belt to press *unevenly* against the V-Pulley and you naturally get *concentrated* wear just where the bulge is greatest—as shown in figure 1-A, at left.

Now, make this same test with the belt that is built with Concave *Sides*—the Gates Vulco Rope!

Whereas you felt an *out-bulge* when you bent a belt with straight sides, you find that the *Concave Sides* merely fill out and become *perfectly straight*. The sides therefore *press evenly* against the V-Pulley. This distributes the wear *uniformly* across the *full width* of the belt. Naturally, this means longer belt life and *lower* belt *costs* for you!

Only V-Belts made by Gates are built with concave sides. Whenever you buy V-Belts, be sure that you get the V-Belt with the Concave Sides—The Gates Vulco Rope!



One of the 3 identical engine-alternator units in No. 18 Plant of the Sinclair Prairie Oil Company near Long View, Texas. The Gates Vulco Rope Drives operated for more than 43,000 hours before any repairs were necessary.

CS-517

Gates

Hose V-Belts Molded Rubber Goods for Industry

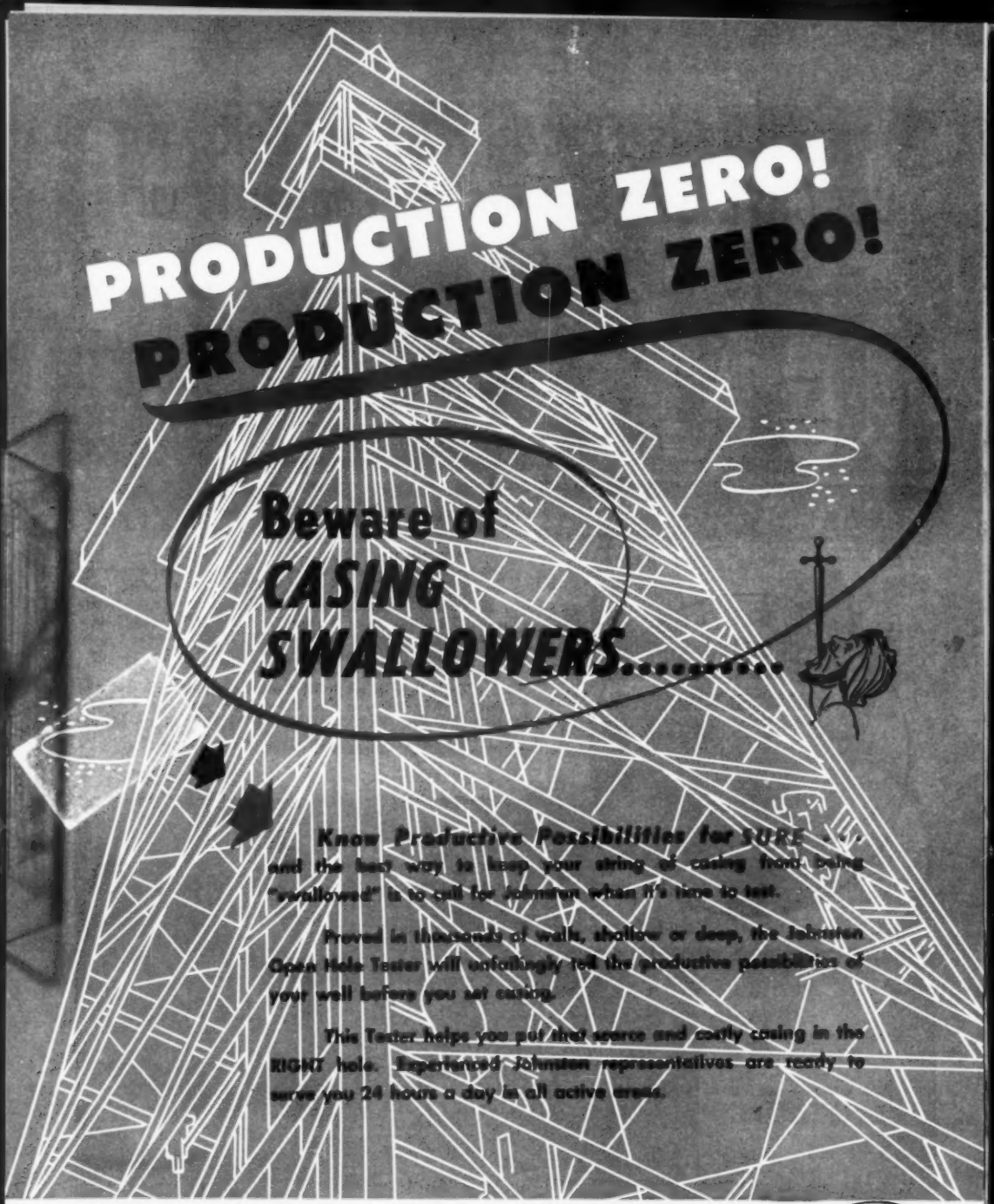
VULCO ROPE DRIVES

ENGINEERING OFFICES AND JOBBER STOCKS IN ALL INDUSTRIAL CENTERS

THE GATES RUBBER COMPANY

DENVER, U. S. A.

The World's Largest Makers of V-Belts



Know Productive Possibilities for SURE . . . and the best way to keep your string of casing from being "swallowed" is to call for Johnston when it's time to test.

Proved in thousands of wells, shallow or deep, the Johnston Open Hole Tester will unfailingly tell the productive possibilities of your well before you set casing.

This Tester helps you put that scarce and costly casing in the RIGHT hole. Experienced Johnston representatives are ready to serve you 24 hours a day in all active areas.

JOHNSTON TESTERS, INC.

5702 NAVIGATION BLVD. • HOUSTON, TEXAS

FORMATION AND CASING TESTING — JOHNSTON

SERVICE BRANCHES IN ALL ACTIVE AREAS

There's a Johnston Service Representative Near You

ANOTHER AMERICAN® ADVANCE

NEW TEFLON SEAL STUFFING BOX FOR HIGH PRESSURE ORIFICE METERS

Pressures to 10,000 psi.
Temperatures to 450°F.

Combining

- MAXIMUM ACCURACY
- MINIMUM FRICTION
- NO LUBRICATION
- NO LEAKAGE
- NO SHAFT FREEZING

New Accuracy! New Efficiency!

This new Type "B" stuffing box extends the benefits of Teflon to heavy-duty high-pressure American Westcott orifice meters — long noted for *simplicity of design, extreme accuracy* and *trouble-free,* dependable service.

The Teflon seal forms a packing and bearing around a precision-made Monel metal shaft of increased diameter for greater rigidity. It is pressure tight, nearly frictionless, *requires no lubrication* and reduces maintenance to a minimum. Other parts are corrosion resistant stainless steel. An external guard protects against shaft damage. The new stuffing box is suited to ambient meter temperatures to 450°F. and pressures to 10,000 psi.

The Teflon bearing and all other stuffing box parts can be removed and replaced in the field. Units are adaptable to older types of American Westcott orifice meters now in service. Write for complete details.

Another example of American's policy of constant product improvement, upholding a century-old tradition of "Sustained Accuracy at Lower Cost."

GENERAL SALES OFFICE: 1513 Race Street, Philadelphia
Albany • Alhambra • Atlanta • Baltimore • Birmingham
Boston • Chicago • Dallas • Denver • Erie • Houston
Kansas City • Los Angeles • Minneapolis • New York • Odessa
Pittsburgh • San Francisco • Tulsa • Canadian Meter Co., Ltd.,
Hamilton, Ontario • Edmonton, Alberta

AMERICAN METER COMPANY EST. 1836 MEASUREMENT ENGINEERS

AMERICAN METER COMPANY
INCORPORATED (ESTABLISHED 1836)

This National Casing

was buried since 1912

It's still in top notch condition — still 100% re-usable!

■ This latest story came to our attention late last year: An oil and gas producer in Ohio bought an old well (drilled in 1912 to a depth of 5300 feet) to be plugged and abandoned according to state regulations. When he pulled the well, intending to sell the casing for scrap, he was surprised to find it practically as good as new, in fact the original National Tube mill stencil was still showing on about half the lengths.

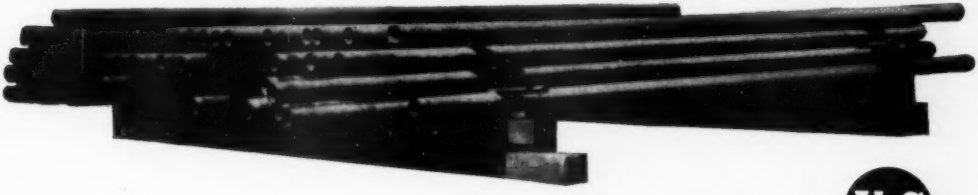
The couplings on all 3500 feet of this casing were in excellent condition. The *threads* on both the pipe and the couplings were clean and sharp; so was the knurling, with no sign of rust or galling.

After careful examination, this near 40-year old casing has been pronounced sound and usable, and instead of being scrapped will be re-used.

We at National Tube are pleased by performance like this, because it tells better than words, that when you use U·S·S National Drill Pipe, Casing or Tubing, you get products that promise long, dependable service.

U·S·S National Drill Pipe, Casing and Tubing have long been distinguished for enduring quality. Throughout the years they have been continually improved by better steels, better heat treating, better fabricating methods, and better thread construction, so that today oil country tubular products bearing the name NATIONAL are still setting new standards for dependability and long time service.

Of course you don't buy casing to pull after 40 years in the ground, but service like this shows that when you *do* buy National you get an extra margin of dependability. So when you plan for future drilling operations, be sure you get the latest information on the performance of National Drill Pipe, Casing and Tubing.



USS

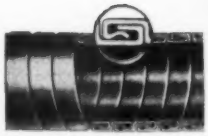
NATIONAL TUBE DIVISION

UNITED STATES STEEL COMPANY, PITTSBURGH, PA.

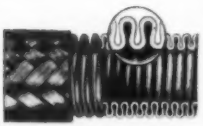
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS · UNITED STATES STEEL EXPORT COMPANY, NEW YORK

UNITED STATES STEEL

Wherever petroleum products must be conveyed . . . . .



CMH convoluted hose is available in a variety of types including square locked, ball bearing and fully interlocked . . . in steel, bronze and other alloys. Sizes up to 12", I.D.



CMH corrugated steel and bronze hose is available in standard sizes from ½" through 12" I.D. for burst pressures to 12,000 psi, temperatures to 1000° F. Stainless steel types also available.

CMH

FLEXIBLE METAL HOSE makes the job easier!

AT THE well head, in transport or in the refinery, CMH Flexible Metal Hose can simplify handling petroleum products. Its high degree of flexibility combined with the rugged durability of metal makes it ideal for any connections that involve motion, vibration or misalignment. Used as vibration connections, as loading and unloading hose, as tank settling connections and in a score of similar applications, CMH Flexible Metal Hose provides the dependability so vital to the petroleum industry. Freedom from deterioration and resistance to wear and tear assures greater over-all economy.

Write for descriptive literature giving full information on CMH Flexible Metal Hose. There is no obligation.

CHICAGO METAL HOSE Division

Flexonics *Corporation*

1345 S. Third Avenue • Maywood, Illinois

Manufacturers of Convoluted and Corrugated Flexible Metal Hose in a Variety of Metals • Expansion Joints for Piping Systems • Stainless Steel and Brass Bellows • Flexible Metal Conduit and Armor • Assemblies of These Components

In Canada: Flexonics Corporation of Canada, Ltd., Brampton, Ontario

Flexon identifies CMH products that have served industry for over 50 years.

CMH

The destructive action of drilling mud under high pressures can make short work of an ordinary valve. The very heart—the crucial seating area—can be washed out of a valve and into the mud pits in a matter of days. But not in the case of NORDSTROM *MUD LINE* VALVES! Nordstrom builds special Hypreseal valves for mud line service. There are no seats or discs in the line of flow to erode. Both the valve body and plug are protected by Merchroming, a Nordstrom process of weld-coating vital surfaces with an abrasion and corrosion resistant alloy. And the built-in internal lubrication system of Nordstrom valves makes it easy to operate always. ● There's a Nordstrom design for every drilling service—Write for Mud Line Bulletin No. V-201. Rockwell Manufacturing Company, 400 N. Lexington Ave., Pittsburgh 8, Pa.

Wherever you are in the oil fields, you're close to a supply house with Nordstrom valves and Nordstrom service.

There's a Nordstrom Valve for Every Drilling Service

Mud Lines	Blow-Out Preventer Manifolds	Jet Lines
Fill Lines	Stand Pipe	Casing Nests
Release Lines		Kelly Cocks
Fuel Lines		Water Lines

Rockwell Built Nordstrom Valves

Another Rockwell Product

Lubricant Sealed to Keep Upkeep Down

...for an impartial decision

What type bearing is best suited to your needs... Straight Roller... Tapered Roller... Spherical Roller... or some other type?

You can be sure of an impartial decision from Torrington which makes *every* type of anti-friction bearing. In addition, Torrington engineers have had broad experience in applying anti-friction bearings to virtually every type of equipment —from household appliances to steel mill machinery.

This experience and an understanding of customers' problems have proved beneficial to many manufacturers. Why not ask a Torrington engineer to help with *your* next problem?

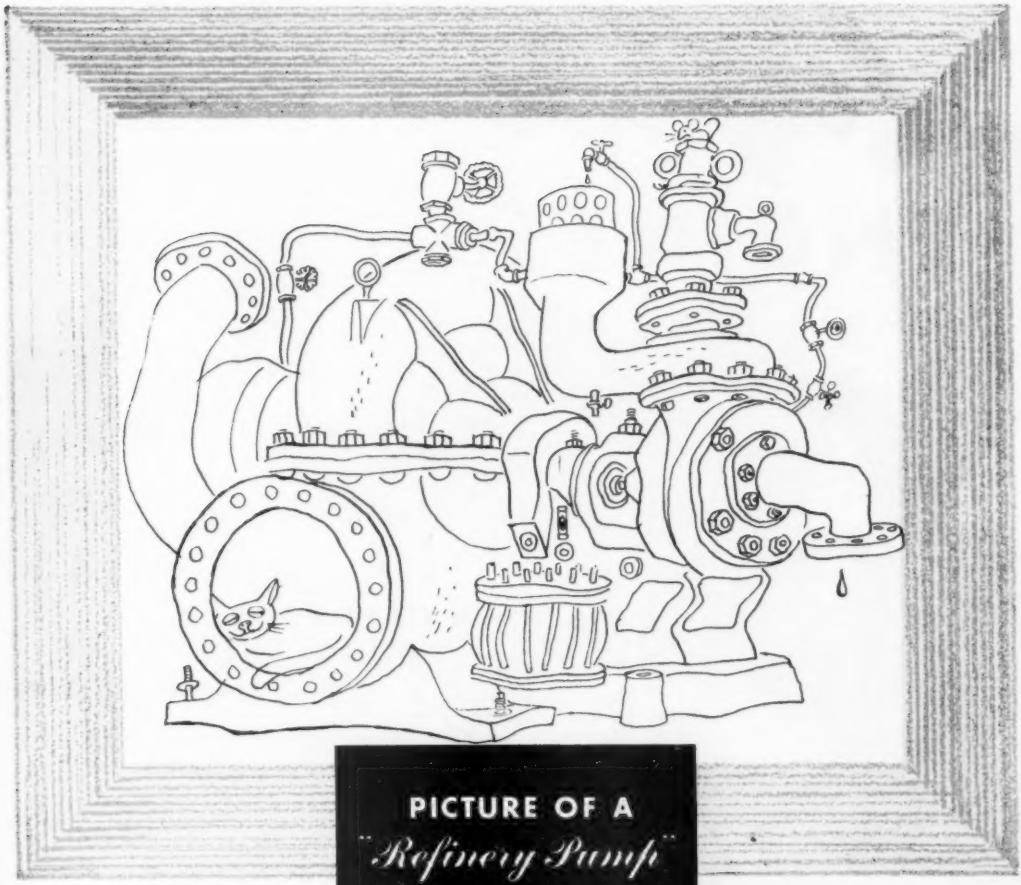
THE TORRINGTON COMPANY

South Bend 21, Ind. Torrington, Conn.

District Offices and Distributors in Principal Cities of United States and Canada

TORRINGTON BEARINGS

Spherical Roller • Tapered Roller • Straight Roller • Needle • Ball • Needle Rollers



PICTURE OF A "*Refinery Pump*"

"Refinery" pump? There ain't no such animal. But if one pump could be all things to all processes, it *might* look like this. Fact is, however, that in refining *it's pretty important to have each pump fitted to its specialized job.* No *one* answer is good for all.

That's why Byron Jackson builds job-engineered pumps. With a BJ you're sure of a pump that sizes up to the need and is pin-point engineered to profitable performance. Starting with more than 25 basic BJ pump designs used in the refinery field, BJ engineers can incorporate features to meet particular pressure, temperature, corrosive, material or power requirements.

When you need a pump for your refinery operation—check with BJ first!

Byron Jackson Co.

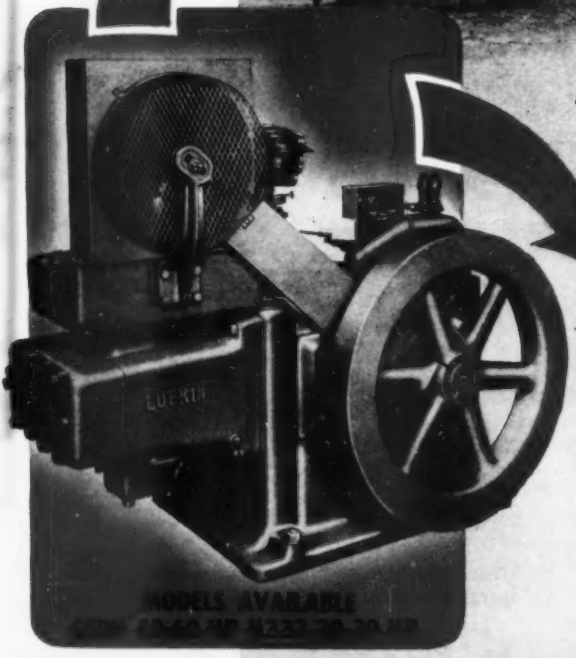
Since 1872

P. O. Box 2017 Terminal Annex, Los Angeles 54, Calif.

OFFICES IN PRINCIPAL CITIES

SEE BJ FOR THE ENGINEERED ANSWER TO YOUR PUMPING PROBLEMS

Lufkin ENGINES



THE Lufkin H333
A DEPENDABLE RUGGED 20-30 HP OIL FIELD ENGINE

Lufkin engine-unit combination means one responsibility—one source for your entire surface pumping equipment. Fifty years of know-how in manufacturing oil field equipment is your assurance of satisfactory, long-life, low upkeep, and dependable service. The Lufkin H-333 gas engine is built around the needs of the oil fields.

- Two cylinder, two cycle, crosshead design for smoothness and long life.
- Condenser cooling for more efficient cooling and lubrication. High even temperatures desired for sour gases are maintained. No water pump troubles.
- Full pressure lubrication with oil under pressure forced to all wear points for longer life and trouble-free service.
- Easy starting by hand. Optional: Built in 12-volt electric starting system, or air-gas motor starting requiring only 25# gas pressure.

Lufkin engines can take it, which has been proven in the field over many years of contiuuous operation. We invite you to write direct or check with your nearest Lufkin representative for information and delivery.

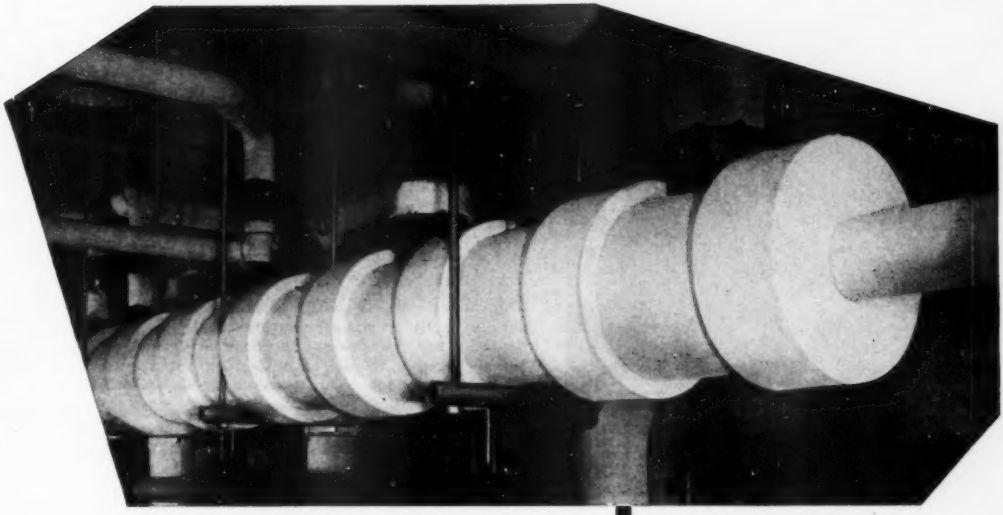
LUFKIN FOUNDRY & MACHINE COMPANY

LUFKIN, TEXAS

Branch sales and service Houston, Dallas, New York, Tulsa, Los Angeles, Seminole, Oklahoma City, Corpus Christi, Odessa, Kilgore, Wichita Falls, Casper, Wyoming, Great Bend, Kansas

Lufkin Equipment in CANADA is handled by

THE LUFKIN MACHINE CO., LTD. 14321 108th Avenue, Edmonton, Alberta, Canada.



MAKE TOUGH JOBS EASY

WITH EASY-TO-USE

UNIBESTOS®

PIPE INSULATION

Ask any user about Unibestos! He'll tell you how easily this good insulation is cut and fit on-the-job, for Unibestos is light, strong, firm—saws cleanly for tight joints—retains initial high efficiency. It is unaffected by service hazards.

Whether you specify Unibestos No. 1200 (for temperatures up to 1200°F.), Unibestos No. 750 (for temperatures up to 750°F.), or Amocel for commercial uses (temperatures up to 600°F.), you'll always save in two ways: (1) quick and simple application; (2) long-lived durability. Your Unarco Distributor can supply you quickly from his stocks of these pipe insulations. Also available in block form for temperatures up to 1200°.

For details on these insulations, ask for Bulletin No. 76-109.

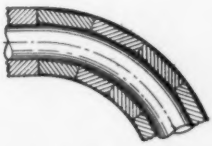
UNARCO

Write for the name of the Unarco Warehousing Distributor in your area.

SEE HOW THESE TYPICAL APPLICATIONS ARE SIMPLIFIED

Unibestos pipe insulation is particularly adaptable for insulating irregular surfaces such as flanges, valves, and fittings. Its firmness and easy-to-fit characteristics make such jobs easy; save time.

Unibestos pipe insulation and block can be used separately or in combination for insulating nested and traced lines quickly and economically.



For insulating pipe bends Unibestos can be mitered easily, and cemented-in with Unarco No. 50 insulating cement.

UNION ASBESTOS & RUBBER COMPANY

DEPT. E-4 • 332 SOUTH MICHIGAN AVENUE • CHICAGO 4, ILLINOIS

"Operators can tell you about these plus values of LANE-WELLS better perforating"

Your Lane-Wells Man

Here are the facts—"reasons why"—reported by oil well operators about Lane-Wells Perforating Service. The entire story would fill a book, but these highlights are mighty important to the men who produce America's oil.

20 years of Progress through Service

LANE WELLS

Better Perforating

PERFORMANCE would be a good general term for results, penetration, and all the Lane-Wells mechanical features which produce it. The trucks, of course, you know, and there isn't space here to tell you how we've designed and redesigned them to make them the finest equipment of their type that exists. Just look one over the next time you see it.

Balanced Design is just as important in perforating as in a car motor. Lane-Wells has worked steadily, ever since they originated modern gun perforating in 1932, to perfect that proper balance between all the elements. A lot of engineering has gone into bullets to get just the right shape, the right length and weight for the job. Powder charges are weighed and packed by machine for proper density. Chambers and barrels are designed and built to get the most out of the combination of proper charge and the right bullet.

Remember also, that Lane-Wells has 6 different types of bullets to handle every type of job, and a full range of guns in all sizes. That way, Lane-Wells brings to your job the equipment that *exactly* fits your needs, not something which 'almost fits.'

Selective Firing is another great feature of Lane-Wells perforating—a feature that gives you any arrangement of perforations you want. You're not tied to any rigid pattern or shot spacing. Instead, you can get 1 shot in a hundred feet, or 100 shots in one foot, or different shot densities in different parts of the same zone. You set the pattern—Lane-Wells can shoot it.

Semi-Selective Koneshot is a Lane-Wells development that allows, for the first time, a measure of control over the perforation density in shaped-charge perforating. With the Lane-Wells F-2 Koneshot Gun you can get, *on one run*, 48 shots in one 141" section, or 48 shots in one 69" section, or 24 shots in each of two 69" sections.

Combination Perforating—both bullets and Koneshot on the same job—is producing results in certain formations, where other methods have proved disappointing. Lane-Wells Combination Perforating gives you the deeper penetration of shaped-charge perforating plus the formation-fracturing effect of bullets, and sometimes makes good producers out of sub-normal wells.

ACCURACY in depth measurement is one of the outstanding features of Lane-Wells perforating. In fact, Lane-Wells depth measuring system is generally acknowledged to be the standard of the industry. We get that accuracy by developing and employing the most precise measuring devices.

Measuring Sheaves, over which the conductor cables run, have a built-in micrometer adjustment to compensate exactly for even the slightest degree of wear.

Conductor Cables themselves are, each and every one, individually calibrated for stretch so the operator can adjust his depth readings with pin-point accuracy. Lane-Wells conductor cables are even calibrated to allow for the difference in measurements between drill pipe standing in the derrick and drill pipe hanging, in tension, in the hole.

Weight Indicator. This is an exceedingly sensitive recording instrument; watching its readings the operator can locate fluid levels, liner tops, tight hole and other changes.

SAFETY is an all-important factor in which Lane-Wells shines. Over-all safety record is very high, and is made possible by safety-engineering every item of equipment.

5-Point Safety Firing System is a fine example of this safety engineering. With this system, the gun is never "live" until it is positioned in the hole. The operator in the truck holds down the firing switch to fire a shot, and four other switches must be thrown or held before the firing switch will operate. This makes accidental discharge almost impossible.

2-Way Speaker System also contributes to safety. The truck and the rigman are in continuous voice communication, serving both to increase speed and efficiency on the job, and to eliminate the possibility of error through hand signals or other makeshift devices.

EXPERIENCE. Well, Lane-Wells has been in the perforating business for twenty years and has done well over 165,000 perforating jobs. Those jobs cover every active oil field in this country, and many abroad. There are very few operating problems or difficult conditions which haven't been encountered and successfully overcome.

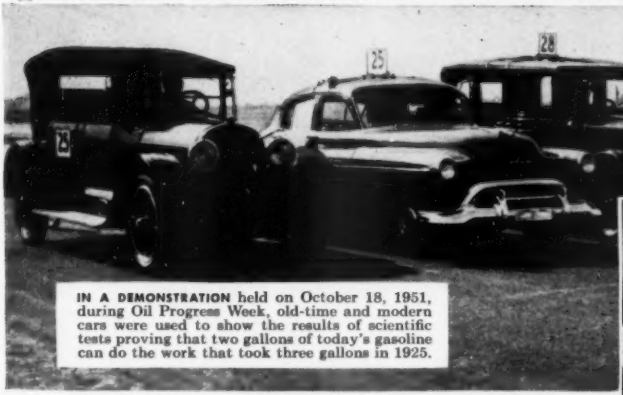
TRAINED CREWS do all Lane-Wells perforating jobs—men who have been thoroughly trained, not only in operating the equipment, but also in oil field problems. They're competent to discuss many well problems, they know your field and your local conditions, and they know the answers to the problems which have come up in many other areas.

Call your Lane-Wells man for the complete story—or, better yet, ask the operators who use Lane-Wells service. Many of them have been Lane-Wells customers since gun perforating was introduced.

AG-504

General Offices, Export Office: Los Angeles • Houston • Oklahoma City and Others • 5610 So. Soto St., Los Angeles 58, California • Lane-Wells Canadian Co. in Canada • Lane-Wells Caribbean Co. in Venezuela

The first in Standard Oil's 1952 series of institutional advertisements tells the remarkable story of an outstanding bargain among things you frequently buy—today's gasoline, the result of free enterprise and competition in the oil industry.



IN A DEMONSTRATION held on October 18, 1951, during Oil Progress Week, old-time and modern cars were used to show the results of scientific tests proving that two gallons of today's gasoline can do the work that took three gallons in 1925.

SPECIAL VALUE

Today's high quality gasoline ...at 1925 prices!

Yes—it's true you get today's gasoline at about 1925 prices. Only the tax is higher.

But its surprisingly low price is only *part* of the value you receive from today's gasoline. The improvement in gasoline performance has been remarkable.

Taking into consideration the increased weight, size, speed and power of modern cars . . . two gallons of today's gasoline can do the work of three in 1925. In combination with today's engines—made possible by improved fuels and lubricants—your modern car can do 50% more work than you got in 1925.

Today's gasoline is a big value chiefly because thousands of petroleum companies, large and small, are competing for business.

Since the end of World War II, members of the petroleum industry have spent 12 billion dollars on new facilities such as oil wells, pipelines, refineries, service stations, and research laboratories. Only in this way, have they been able to add the capacity and make the quality needed to meet your needs and national defense requirements.

During the same period Standard Oil and its subsidiary companies have spent over one billion dollars in this way. An important part of this money has come from re-investment of two-thirds of its profits for new tools and equipment in a vast expansion program.

We're not only in a race to *meet* ever-growing demand with bigger volume . . . we're also in a race to *build* demand with higher quality products.

All of which means that, as far as Standard Oil is concerned, you can look forward to an even better value in gasoline tomorrow.

Standard Oil Company
(INDIANA)

GASOLINE'S A BARGAIN because workers like P. P. Scott, research engineer, of Tulsa, Oklahoma, are at work on new methods of producing crude oil to offset rising production costs and to locate new sources so that we can have enough oil to meet the ever-increasing demand. Plowing back two-thirds of our profits into facilities for finding, refining, and distributing petroleum products has helped Standard Oil hold down prices of finished products, while continually raising quality.

GASOLINE'S A BARGAIN because workers like Ed. E. Herndon, stillman at our Neodesha, Kansas refinery, have the latest and best tools to work with, so that more products and better products can be processed to meet rising demand. The investment of our 116,000 owners has made possible the costly equipment which modern refineries require. The modern tools and equipment with which our employees work help them to produce more, earn more, and to enjoy steadier employment.

GASOLINE'S A BARGAIN because thousands of Standard Oil dealers—independent businessmen like Bill Paisley of Wichita, Kansas—offer it to you in convenient locations as you need it, at surprisingly low prices. Mrs. C. S. Ward, one of Bill's regular customers, knows she can depend on good value in the products and services at her neighborhood Standard Oil station, not only because the prices she pays are reasonable, but because she can rely on the products she uses for consistent high quality.

FogFOAM is discharged directly into flames, smothering fire in seconds.

Plane Crash Fire Controlled in Seconds

. . . *with Rockwood-equipped fire truck*

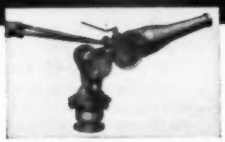
When Pratt & Whitney Aircraft division of United Aircraft Corporation decided to design a really outstanding fire truck, they turned to Rockwood for the special fire-fighting equipment needed. The result? A mobile unit that controls aircraft crash fires in seconds.

Two Rockwood FogFOAM Turret Nozzles mounted over the driver's cab are unique features of the unit. They discharge huge quantities of FOAM or FogFOAM into the fire, smothering flaming gasoline and blanketing wreckage. The Rockwood FOAM flows freely at sub-zero temperatures, clings to metal surfaces as an insulator, can be easily washed away after fire is put out.

If crash fires occur, the truck can speed directly to the scene . . . reaching any corner of a 650-acre flying field in one minute. Test fires have been controlled in less than 30 seconds!

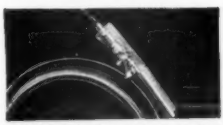
Similar equipment is used for fighting gasoline spill fires on city streets, refineries, industrial plants, etc.

Get the Complete Facts! Rockwood's contribution to the Pratt & Whitney Aircraft truck is but one of many successful applications of Rockwood fire-fighting equipment. All types of equipment to combat all types of fires are available at Rockwood — or made to individual requirements. For complete details, send for your copy of our new illustrated catalog.



ROCKWOOD Type FFF FogFOAM Turret Nozzle can be manually operated from roof of cab. Other types of Rockwood Turrets can be hydraulically operated from within cab. Provides 4 different types of discharge: FogFOAM, solid FOAM stream, WaterFOG, and solid water stream.

ROCKWOOD Under Truck Nozzles and Ground Sweep Nozzles protect front and under parts of fire trucks. Also puts out fires in path of truck. Discharges FogFOAM or WaterFOG.



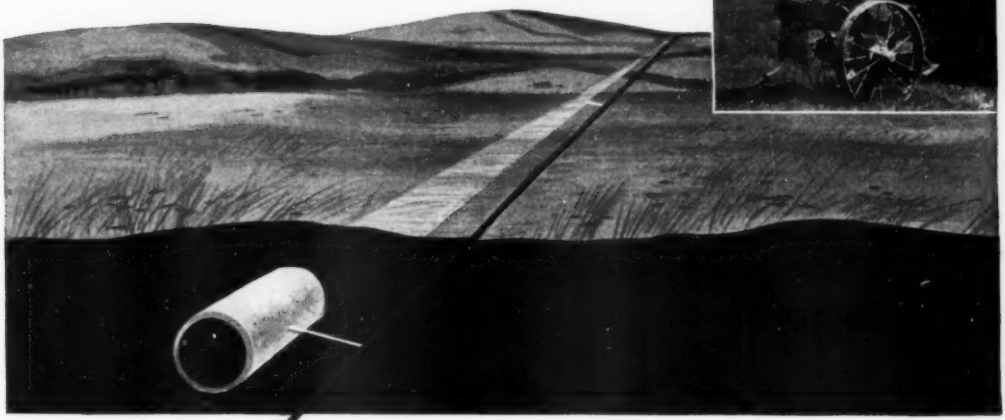
ROCKWOOD Hand Lines utilize Rockwood SG Type Nozzles. They discharge High Velocity WaterFOG, FogFOAM, Solid FOAM Stream and Straight Water Stream and are available in 1" sizes only.

ROCKWOOD SPRINKLER CO.

104 HARLOW ST., WORCESTER 5, MASS.

GALVO-LINE

the RIBBON Magnesium Anode for corrosion control



particularly adapted for easy and economical installation

Are you applying cathodic protection to your pipelines? THEN— Don't overlook the advantages of Galvo-Line.®

This magnesium ribbon provides protection with less current than other methods by distributing it evenly along the pipeline. Not only that—but it produces several times more current per pound than other conventional galvanic anodes. Thus, Galvo-Line is distinctly more economical in soils where the current output of other anodes is low.

Here's an example of its effectiveness: 45,000 feet of Galvo-Line was installed on badly corroding sections of a 60 mile bare gas line in 1948. During the four years prior to this installation 25 per cent of the leaks occurred in these sections. After installing Galvo-Line only 3 of over 200 leaks on this line have appeared in these protected sections. AND— NO LEAKS have been found in over 2½ years.

One more fact. This installation cost less than one half of a conventional anode system. It does pay to investigate Galvo-Line. Write Dow today for more details.

AUTHORIZED DISTRIBUTORS: ANTI-CORROSION MFG. CO., Atlanta, Georgia • CATHODIC PROTECTION SERVICE, Houston, Texas • DOWELL INCORPORATED, Tulsa, Oklahoma • ELECTRO-RUSTPROOFING CORP., Belleville, N. J. • STUART STEEL PROTECTION CORP., Kenilworth, N. J. • THE VANODE CO., Pasadena, California

THE DOW CHEMICAL COMPANY

Magnesium Department • Midland, Michigan

New York • Boston • Philadelphia • Atlanta • Cleveland • Detroit • Chicago
St. Louis • Houston • San Francisco • Los Angeles • Seattle
Dow Chemical of Canada, Limited, Toronto, Canada.

DOW CHEMICALS
INDISPENSABLE TO INDUSTRY AND AGRICULTURE

This Simple Compressor Meets the Complex Needs of a Changing Petroleum Industry

It's the Nash!

Here is a compressor presenting advantages found in no other device. Nash Compressors have only one moving part, rotating without metallic contact with the pump casing. No internal lubrication is required. Yet they produce 75 lbs. pressure in a single stage, with capacities to 6 million cu. ft. per day in a single structure.

There are no valves, gears, pistons, sliding vanes, or other complicated wearing parts in a Nash. Compression is secured by an entirely different principle of operation. Because of this, gas pumping problems difficult with ordinary pumps are often easily handled by the Nash. For example, Nash Pumps are standard equipment in the Synthetic Rubber Industry, where they have met the needs of new and difficult processes.

Nash Compressors are compact and save space. They run without vibration, and compression is without pulsation. They maintain original performance over long periods. Service is assured by a nationwide net-work of Engineering Service offices. Instructive bulletin shows how they operate. Write for it.

One moving part.

No internal wearing parts.

No valves, pistons, or sliding vanes.

No internal lubrication.

Low maintenance.

Slugs of liquid entering pump do no harm.

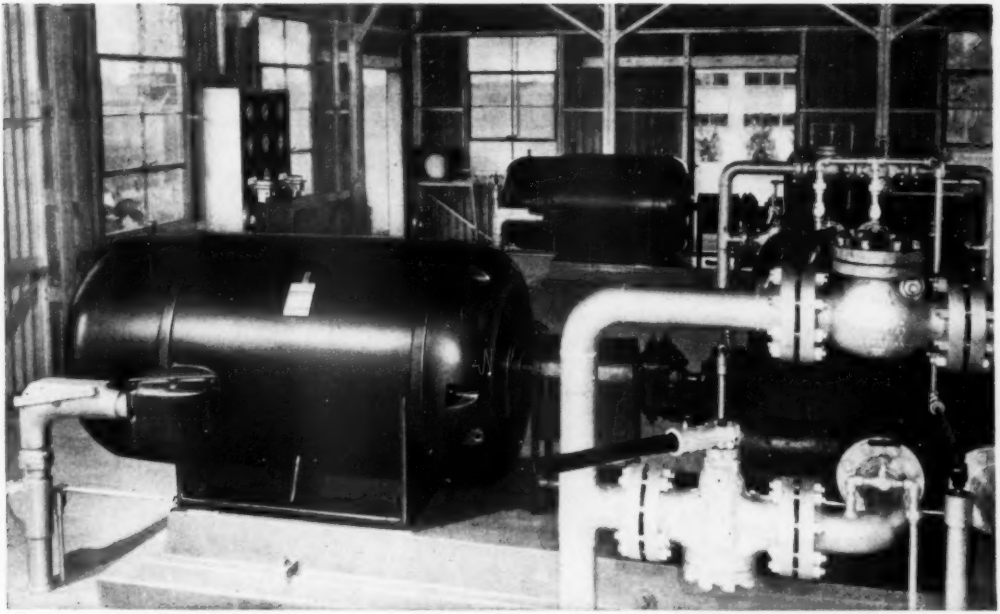
Non-pulsating pressure.

Saves floor space.

75 pounds in a single stage.

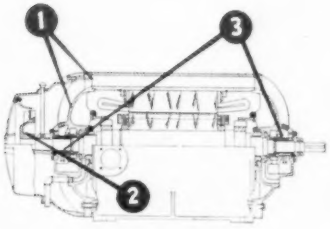
NASH ENGINEERING COMPANY

274 WILSON, SO. NORWALK, CONN.



Driving the main pumps in a Texas pipeline station, these two G-E explosion-proof induction motors—each rated 350 hp—are controlled either from master panel in control building outside or from the two G-E explosion-proof push-button starters at left.

No need to isolate these motors!



Let's look inside!

1. Double-shell construction utilizes inner shell to protect electrical parts; outer shell to direct flow of cooling air.

2. Non-sparking fan draws in air through protective screen for efficient cooling.

3. Bearing completely enclosed in a cast-iron housing with long running clearances to prevent entrance of dirt and liquids.

G-E Tri-Clad* explosion-proof motors—as in this products pipeline station in Texas—eliminate need for firewall, cut station construction costs

Supplying a variety of oil products, this major oil company operates an extensive pipeline system from Texas to markets in northeastern areas. And for 5 years, in several of the line's pumping stations, General Electric explosion-proof induction motors have been doing a reliable, minimum-maintenance job in helping to keep throughput at a maximum.

Because they require no expensive, specially-built vaults, and no firewall between motors and pumps, G-E explosion-proof motors cut station construction costs, save engineering and installation time. You can locate your equipment solely for convenience, ease of maintenance, and economy of space. And because they do away with remote coupling and shaft seal at the firewall, they require less maintenance, too.

Whatever *your* pipeline electrification needs, with General Electric you're sure of the broadest line of motors, control and power distribution equipment—co-ordinated for maximum efficiency. The petroleum specialist in your nearest G-E office has more information, but in the meantime send for Bulletin GEA-5423. *General Electric Company, Schenectady 5, N. Y.*

*Registered trade-mark of General Electric Co.

661-33

Everything you need to cut oil pipeline costs —ELECTRICALLY!

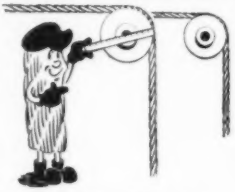
GENERAL ELECTRIC

DRILLERS...

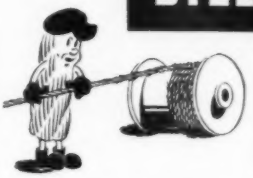
do you want to cut operating costs?

J&L STEEL

Here are a few tips on longer Wire Rope Service Life!



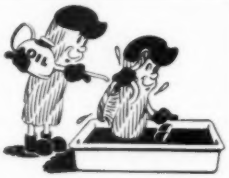
Avoid Small Drums and Sheaves



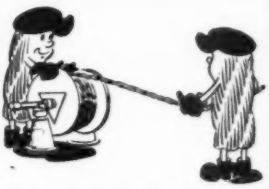
Keep Lines from Rubbing

Keep Drums and Sheaves Aligned

Check Your Sheave and Drum Grooves



Lubricate Your Lines Regularly



Use Jacks When Transferring Lines from Reel to Drum

SPECIFY J&L DRILLING LINES FOR YOUR EQUIPMENT

Proof of the value of any wire line lies in its performance on the job. The unexcelled performance record of J&L Wire Ropes can be traced to J&L's *quality control* method of manufacture. *Quality control* that ensures the finest finished product by regulating every step in the manufacture of wire rope from the mining of iron ore to final stranding and closing operations. The result is wire rope that provides maximum service life—helps keep your operating costs to a minimum by cutting down time for re-rigging and making possible *maximum hole per wire rope dollar.*

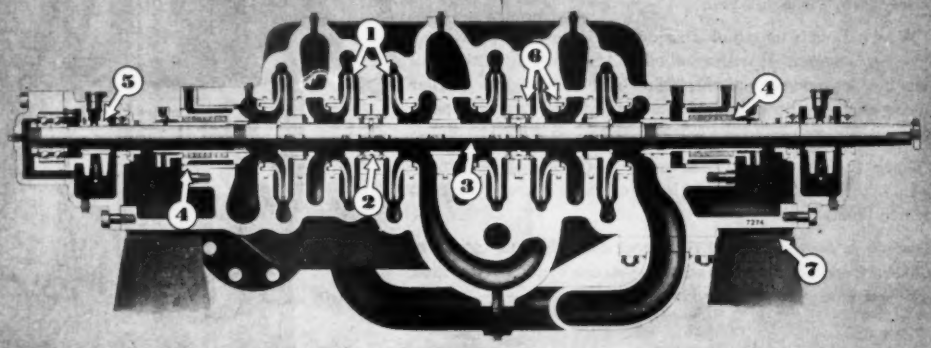
If you're not already using J&L drilling lines, why not contact your nearest J&L representative *today.*

JONES & LAUGHLIN STEEL CORPORATION
PITTSBURGH 30, PA.

Simplicity, long life, easy maintenance

CAPACITIES TO 1000 GPM
PRESSURES TO 1200 PSI
TEMPERATURES TO 350-400F

1. Opposed impellers balances axial thrust.
2. Impeller mounting provides leak-proof shaft sealing between stages.
3. Exposed shaft insures freedom from distortion.
4. Removable stuffing boxes permit flexibility in shaft sealing arrangement.
5. Split sleeve radial bearings are standard.
6. Positive interstage wearing ring seals eliminate leakage.
7. Casing support insures coupling alignment.



You get them all with...

DE LAVAL
OPPELLER PUMPS

Look at the seven outstanding features shown in the cross-section and you'll see why De Laval Refinery Pumps stay on the line for years...trim maintenance costs. Use these pumps for service up to approximately 1,000 gpm and 1,200 psi with temperature up to 350-400F. They can handle liquids ranging from propane to strong caustic. Write today for bulletin giving full application and specification data.

Refinery Pumps

DE LAVAL STEAM TURBINE COMPANY
Trenton 2, New Jersey

DL 144

Thermoid
Industrial Rubber Products
Quality Value Service

Thermoid Trioflex Rotary Hose makes new friends among old timers

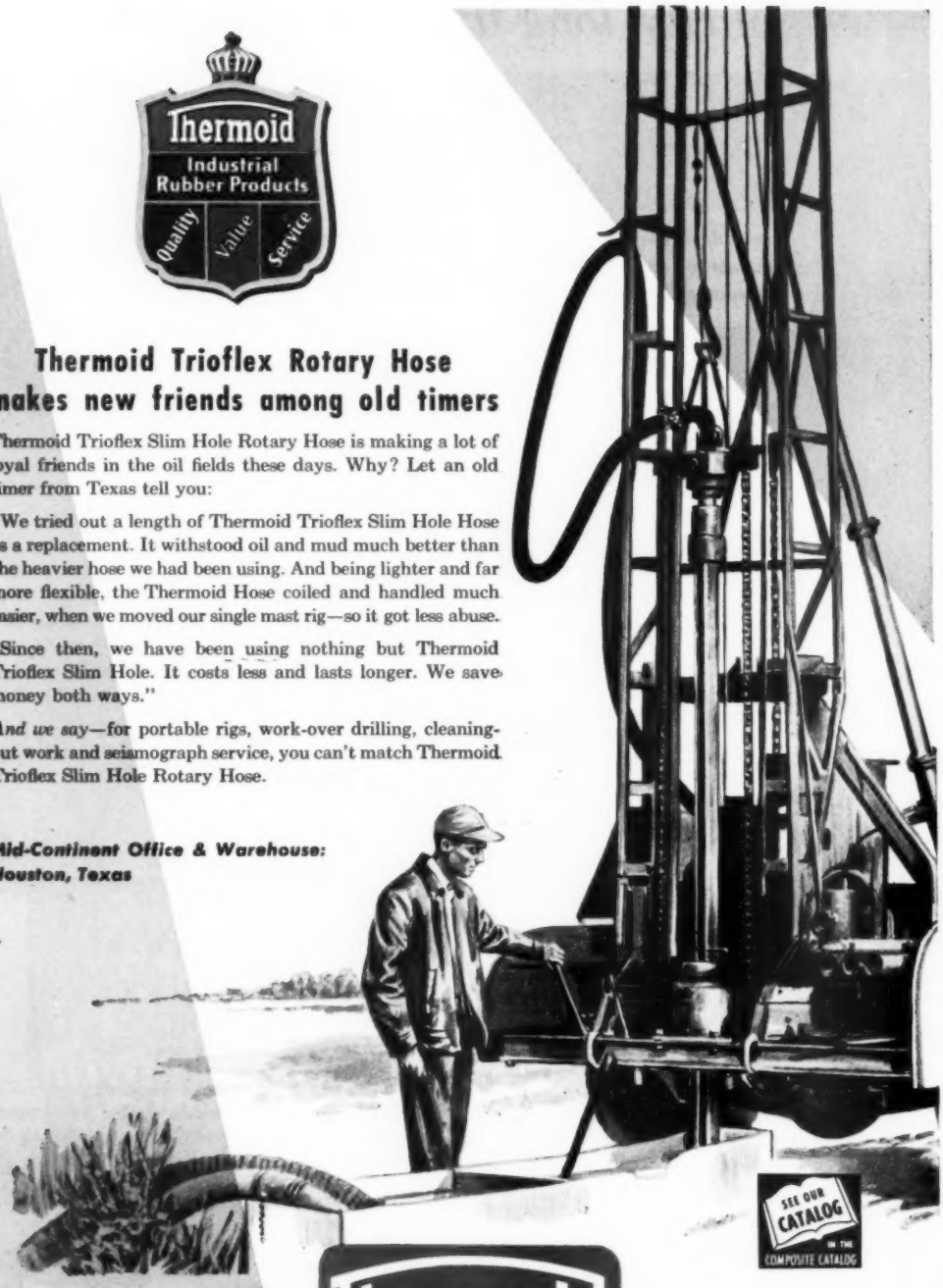
Thermoid Trioflex Slim Hole Rotary Hose is making a lot of loyal friends in the oil fields these days. Why? Let an old timer from Texas tell you:

"We tried out a length of Thermoid Trioflex Slim Hole Hose as a replacement. It withstood oil and mud much better than the heavier hose we had been using. And being lighter and far more flexible, the Thermoid Hose coiled and handled much easier, when we moved our single mast rig—so it got less abuse.

"Since then, we have been using nothing but Thermoid Trioflex Slim Hole. It costs less and lasts longer. We save money both ways."

And we say—for portable rigs, work-over drilling, cleaning-out work and seismograph service, you can't match Thermoid Trioflex Slim Hole Rotary Hose.

Mid-Continent Office & Warehouse: Houston, Texas



SEE OUR CATALOG IN THE COMPOSITE CATALOG

Thermoid

Powerflex Rotary Hose • Trioflex Slim-Hole Rotary Hose • Mud-Flo Slush Pump Hose • Flexible Discharge Units • F.H.P. and Multiple V-Belts • Oil Country Flat Belting

Wire Line Turn Backs • No-Wip Line Savers • Stuffing Box Rings • All Types of Hose • Molded Specialties • Brake Blocks

Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah

THE FIRST AND
THE LAST WORD
IN LOGGING!

WHY OPERATORS
PREFER
SCHLUMBERGER!

NOW! SUPERIOR SERVICE!

in

MIDLAND, TEXAS

IRON WORKS & SUPPLY CO. INC.
SHREVEPORT
SUPERIOR
LOUISIANA

Tom C. Hendricks is Superior's District Manager in charge of our Midland Store and West Texas operations. Tom invites you to drop by and discuss any supply problem with him; if he doesn't have your item in stock he can locate it for you in a matter of hours.

F. Herman Gibson, who has long been associated with the oil and gas industry, supervises Superior's Supply operation. His base of operations at Dallas includes: Ft. Worth, Abilene and all of West Texas including the Permian Basin.

In order to facilitate deliveries and serve our many friends in the Permian Basin area, on January 15, 1952, we formally opened our new supply store at Midland, Texas. All the facilities of Superior, plus an experienced and dependable staff of eight oil and gas supply men have been placed in this strategic location to give you equally important time-and-money-saving suggestions. Stop by on the Garden City Highway and meet the boys. For Superior Service in Midland—Phone 4-6343.

SUPERIOR IRON WORKS & SUPPLY COMPANY, INC.

GENERAL OFFICE: 1202-04 MARSHALL • P.O. BOX 1800 • SHREVEPORT, LOUISIANA

when time is money!

Drillers and production men look to

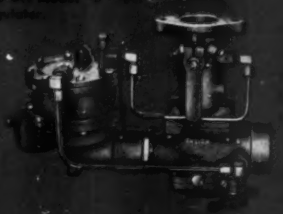
ENSIGN CARBURETION

for DEPENDABLE low cost

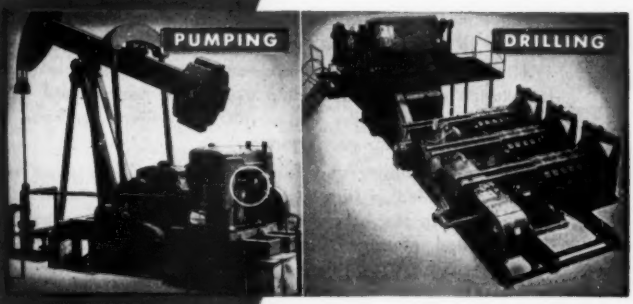
GAS ENGINE PERFORMANCE

With every well drilling operation boiled down to a split second, there's little excuse nowadays for an unscheduled shut-down due to drilling engine failures. Gas engines provide DEPENDABLE and ECONOMICAL 24 hour service with the least maintenance. Good performance depends largely upon the carburetion, which is the case of over 90% of all gas engines is ENSIGN. Over 35 years of carburetor experience are designed into the simple and rugged Ensign models used on today's engines. Operators everywhere have learned to count on gas engines equipped with ENSIGN.

ENSIGN Model "Kool" combination Carburetor for use with Natural Gas, Butane-Propane or Gasoline.



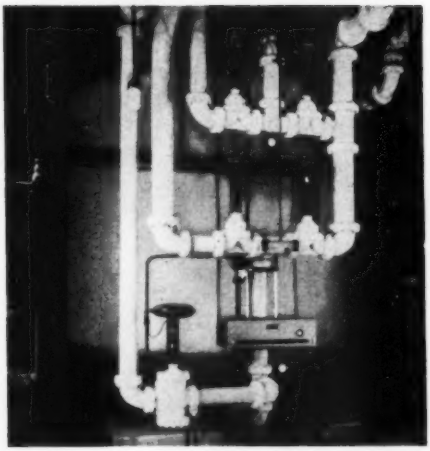
ENSIGN Model "Kay" Straight Gas Carburetor for either Natural Gas or Butane-Propane, and ENSIGN Model "G" for Gasoline Engines.



Easy to start and easy to adjust on either Natural Gas, Butane-Propane or Gasoline, ENSIGN offers a proven unit. It matters little the type of engine from a single cylinder or the high speed multi-cylinder, ENSIGN is proved and accepted the world over for the best all around performance and dependability.

ENSIGN
CARBURETOR COMPANY
Dealers and Distributors in All Principal Oil Fields

7010 SO. ALAMEDA ST., P.O. BOX 229, HUNTINGTON PARK, CALIF. • BRANCH FACTORY: 2330 W. 58TH ST., CHICAGO 36, ILLINOIS



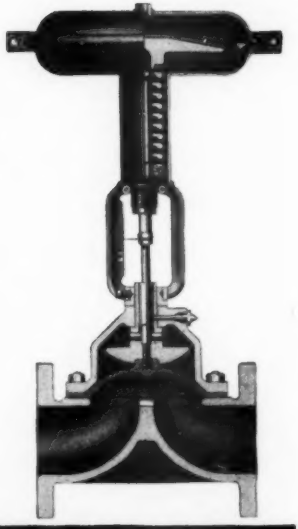
HOW K & M VALVES HELP "SOFTEN UP" 120,000 GALLONS OF HARD WATER PER HOUR

The mineral salts in hard water can cause extremely costly damage to the boilers of a power plant.

At one of America's most important industrial plants, a massive installation of cation and anion exchangers "softens up" or demineralizes water at the rate of 120,000 gallons per hour, thus protecting the steam generators.

The big exchanger units are complicated and require trustworthy regulation of flow at many points. 125 K & M Saunders-Type valves in the assembly do the job with safety, certainty and precision. Moreover, the installation has been so successful that the company is building a similar one, for which K & M valves are also being used.

Leaders in many industries look to K & M valves for proved sensitivity and endurance. K & M is geared to handle the smallest or largest problem in control valves, however exacting the requirements. Our engineers invite your inquiries.



K&M

KIELEY & MUELLER, INC.

Valve Makers Since 1879

2033 - 43rd STREET NORTH BERGEN, N. J.

a few words about alloy steels

and how we can help you switch to ALTERNATE ALLOY GRADES

You've probably had trouble getting the alloy steels you've been accustomed to running. You've got the headache of choosing the best available alternate alloys, plus the headaches of how to machine and heat-treat them.

That's where we can help . . .

Republic 3-Dimension Metallurgical Service combines the experience of your metallurgist and your production men with our 3-man team . . . the Republic Field and Laboratory and Mill Metallurgists. You tell us what you want the steel to do . . . we tell you the best available alternate, help you take the bugs out of using it.

In spite of restrictions you can probably switch to one of the many grades being made by Republic . . . world's largest producer of alloy and stainless steels.

When may our Republic Field Metallurgist call?

REPUBLIC STEEL CORPORATION
Alloy Steel Division • Massillon, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N.Y.

LAB MILL FIELD
3-DIMENSION Metallurgical Service

Republic REPUBLIC STEEL
ALLOY STEELS

Other Republic Products include Carbon and Stainless Steels—Sheets, Strip, Plates, Pipe, Bars, Wire, Pig Iron, Bolts and Nuts, Tubing

MANHATTAN RUBBER HOSE

Every time oil moves there's a special Manhattan hose to help. On the drilling rigs that bring in the new wells Ray-Man Rotary Hose with built-in streamlined couplings sets new standards for flexibility, ease of handling and safety.

For transportation by oil tanker, Paranite Oil Loading Hose is designed for rapid delivery between shore and ship. Its Oil-Proof Flexlastic construction is designed for the most rapid delivery possible. Superior strength, safety and leak-proof features make it top choice at most marine terminals.

Other Manhattan hose of equally high quality helps make final deliveries of gas and oil at bulk stations and on tank cars and trucks. Continuing progress in special hose developments for petroleum problems leads the oil industry to look to Manhattan as Hose Headquarters. Write for Catalog No. 6903, covering Hose, V-Belts and other products for the petroleum industry.

SPECIAL OIL FIELD PRODUCTS DISTRIBUTED BY NATIONAL SUPPLY COMPANY

R/M

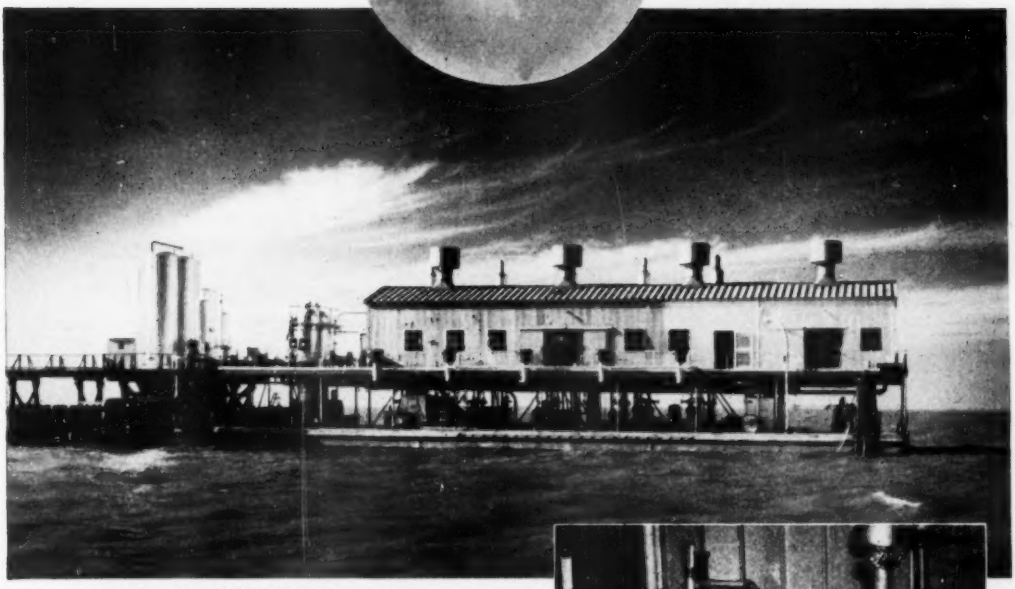
MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Packings • Brake Linings • Brake Blocks
Clutch Facings • Asbestos Textiles • Sintered Metal Parts • Bowling Balls

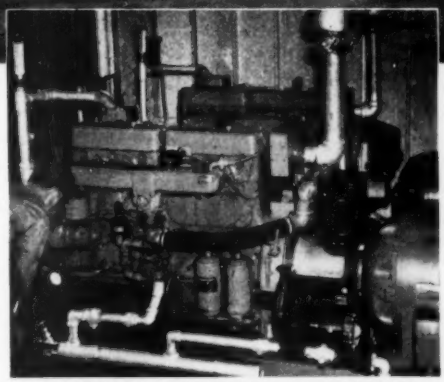
in the world's oil fields

...for every service



GULF OIL CORPORATION Floating Compressor Station—with two **WAUKESHA Model 6-WAKU Oil Field Gas Power Units** (lower picture) driving electric generator sets supplying power for cooling large engines, auxiliaries, and lighting. Gulf has three of these floating stations, mounted on barges tied to piling, near mouth of Mississippi River to eliminate flaring of gas in five Louisiana oil fields. (Top view is typical of these stations.)

● In every major oil field in the world—no matter how power is used—you'll find Waukesha Engines. Whether for drilling, pipe line pumping, well pumping, well servicing, auxiliary plants, recycling or refinery processing—there is a Waukesha engine or power unit for that particular service. Six and four-cylinder types... to operate on Diesel fuels, natural gas, butane, or gasoline... Waukeshas range from 10 hp to over 500 hp. Send for Bulletin 1079.



Two WAUKESHA 6-WAKU Oil Field Gas Power Units driving generator sets in Gulf Oil Corporation floating compressor station. Model 6-WAKU is a six-cylinder, 6¼-in. x 8½-in., 1197 cu. in., overhead valve, self-contained unit with every modern feature of design, and rugged to the last fine detail. Get Bulletin 1556.

WAUKESHA MOTOR COMPANY • **WAUKESHA, WIS.**
NEW YORK TULSA LOS ANGELES

WAUKESHA *Oil Field* POWER

167

Bucyrus-Erie Spudders Set the Pace in MOBILITY

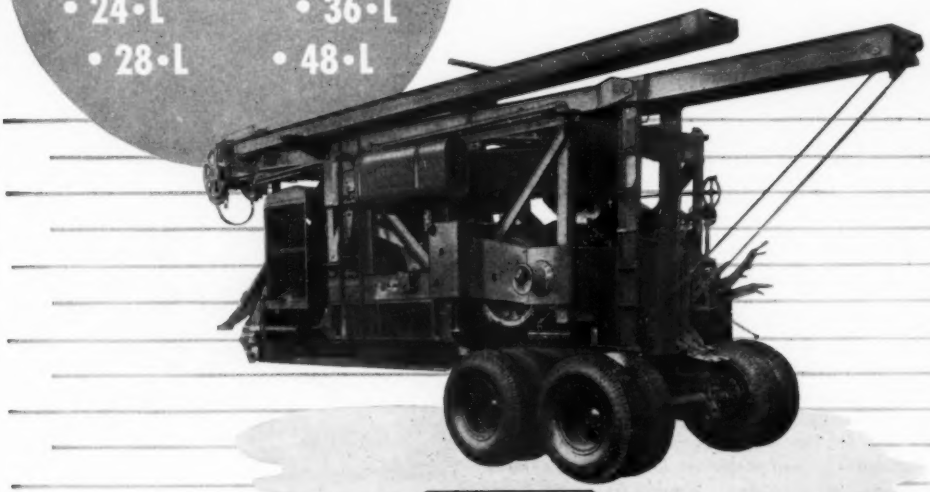
Fast moves chop off non-profit time — and mobile Bucyrus-Erie spudders are right at the head of the pack when it comes to quick location-to-location jumps. With these dual pneumatic semi-trailer or tandem axle units, you can transport spudder and working tools in a single compact unit — at normal highway speeds.

For platform operation, Bucyrus-Erie spudders have smooth bottom skids that slide easily on and off oil country trucks, derrick platform or mud boats. Down time is cut to a minimum.

Mobility is just one of many Bucyrus-Erie pace-setting advantages. Get full details from your Bucyrus-Erie spudder distributor. 128552

FIRST
With the FINEST in spudders

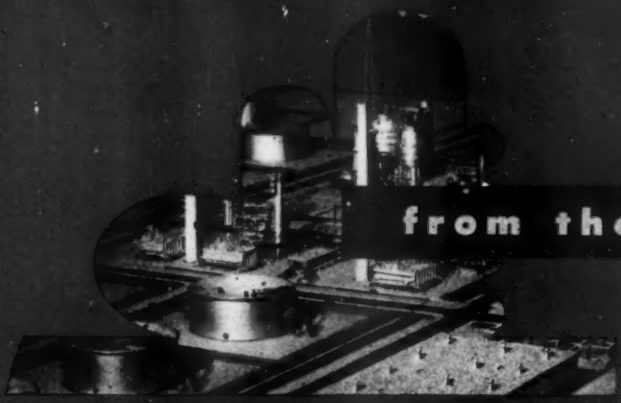
- Four Great Models
- 24-L
- 36-L
- 28-L
- 48-L



See or Write Your BUCYRUS ERIE Spudder Distributor

BEACON SUPPLY CO. - - - - - Borger and Pampa, Texas
BECKWITH MACHINERY CO. - - - - - - - - - - - - - - Pittsburgh, Clearfield, and Bradford, Pa.
BUCKEYE SUPPLY COMPANY - - - - - - - - - - - - - Zanesville and Wooster, Ohio; El Dorado and Chase, Kan.
DRILLERS SUPPLY CO. - - - - - - - - - - - - Joplin, Mo.
DRILLING & MINING EQUIPMENT CO. - Los Angeles 21, Calif.
GREAT NORTHERN TOOL & SUPPLY CO. - - - - - - - - - Billings, Kevin and Cut Bank, Mont.; Casper, Wyo.
IVERSON SUPPLY CO. - Oklahoma City, Okmulgee and Tulsa, Okla.; Ft. Worth, Kermit, Odessa, Snyder, and Midland, Texas; Artesia and Farmington, N. M.
LUCEY EXPORT LTD. - - - - Calgary and Edmonton, Alta.
McJUNKIN CORPORATION - - Charleston, W. Va.; Allen, Ky.
OLYMPIC SUPPLY CO. - - - - - - - - - - Seattle, Wash.
RANDALL-ZOGG SUPPLY CO. - - - - - - - Princeton, Ind.
THE STRAKER SUPPLY - - - - - - - - Mt. Pleasant, Mich.
TILLSONBURG PIPE & SUPPLY CO. - - - - Tillsonburg, Ont.

new products



from the refinery

Ethylene . . . Aromatics . . . Hydrogen . . . Sulfur . . . Ammonia . . . Alcohols

These products are now being made in petroleum refineries.

Foster Wheeler's integrated engineering and construction organization has served both the petroleum and chemical industries for over 30 years in the design and construction of process units and complete refineries and chemical plants.

FOSTER WHEELER CORPORATION

165 BROADWAY, NEW YORK 6, NEW YORK

FW

puts the HEAT on heat exchangers

By changing to Yarway Impulse Steam Traps, an oil refinery reports much hotter steam in their heat exchangers **—plus two other important extras:**

(1) They were able to operate the plant with 6 boilers instead of the 8 formerly required.

(2) Three men formerly required to service old-type traps can now be used for productive work.

Significant sidelight—these Yarway traps are operating under severe conditions, many outdoors with temperatures often below zero.

Plant after plant is standardizing on Yarway Impulse Steam Traps because Yarways are designed to deliver the most premium B.T.U.'s at top temperatures into your process or product. **They get equipment hotter, sooner ... and keep it hot.**

Other reasons—small size, easy installation, good for all pressures, only one moving part, low maintenance, low price.

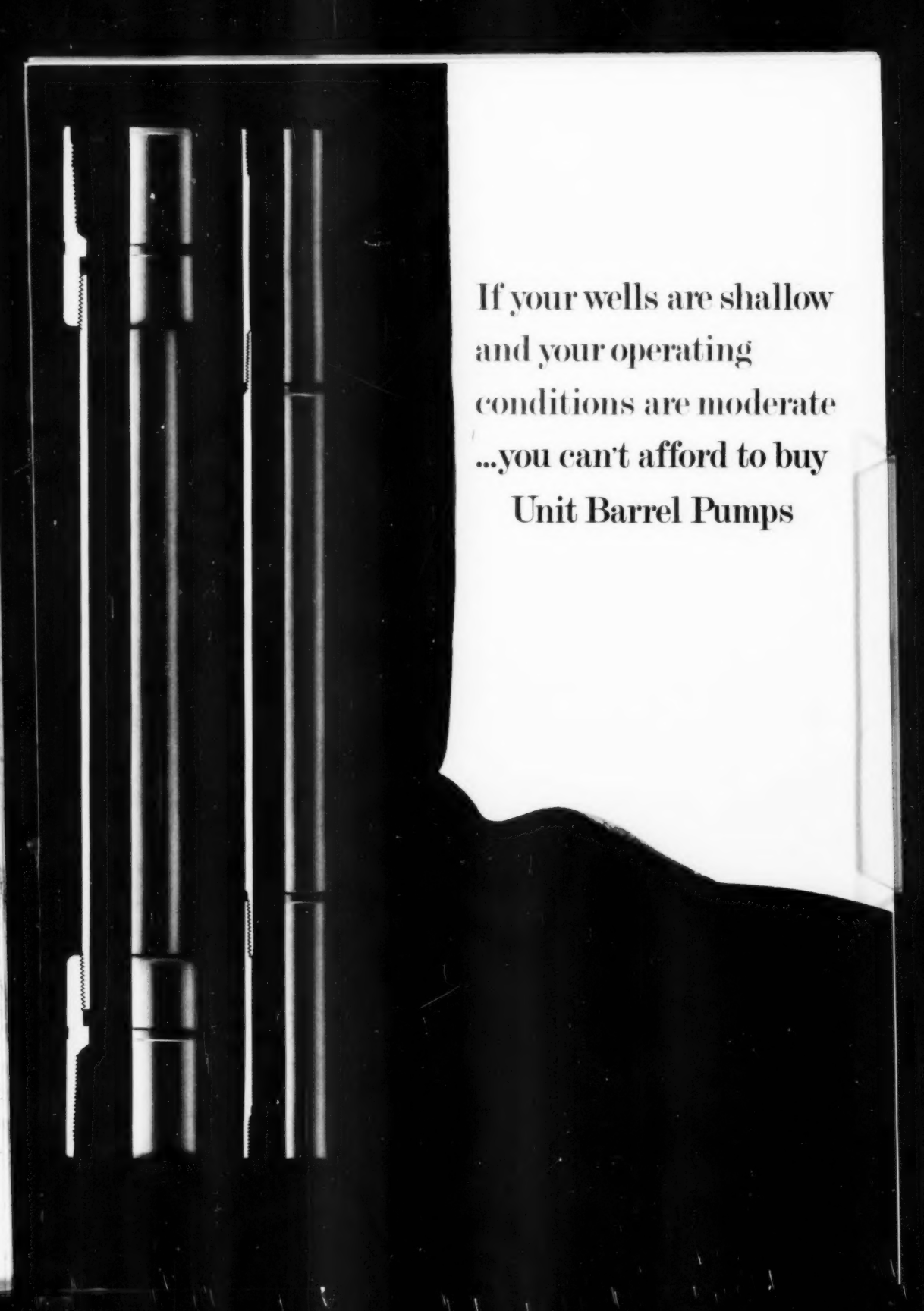
Buy your Yarway Impulse Steam Traps from one of the 216 distributors handling this product.

ACTUAL SIZE ¾" YARWAY STEAM TRAP

YARNALL-WARING COMPANY
136 Mermaid Ave., Philadelphia 18, Pa.

FREE OFFER. Don't take our word for it. Test Yarway's advantages in your own plant, without cost or obligation. Drop us a card or letter—a trial trap will be delivered promptly.

YARWAY the steam trap
designed with more production in mind

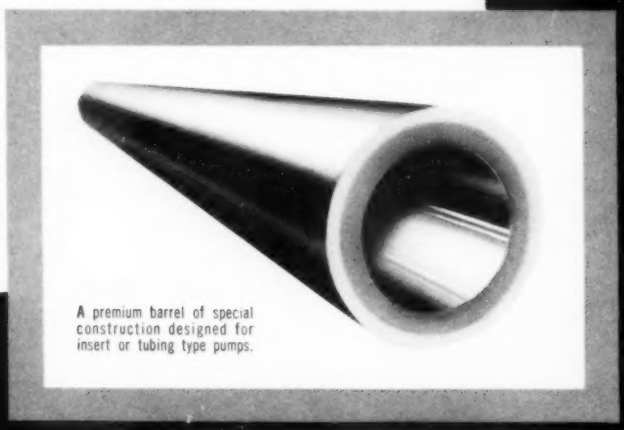

If your wells are shallow
and your operating
conditions are moderate
...you can't afford to buy
Unit Barrel Pumps

If your wells are deep
or your pumping
conditions are
exceptionally severe
... you can't afford
not to buy

oilmaster

Unit Barrel Pumps

Write for Descriptive Literature



A premium barrel of special construction designed for insert or tubing type pumps.

Fluid Packed Pump Company

MAIN OFFICE AND PLANT LOS NIETOS, CALIFORNIA

Distributed by the National Supply Co., Toledo, Ohio

Export: The National Supply Co. Inc., Export Division, 600 Fifth Avenue, New York

Co-Distributors: Berry Supply Store; Beacon Supply Co.; Industrial Supply Co.

oilmaster
PUMPS
FOREMOST IN THE INDUSTRY

They Say—

Progress in Safety

"In 1951 our accident-frequency rate was 2.55 per million hours worked. Five years ago, the General Petroleum accident rate was 10.79, more than four times as high as last year.

"Our company self-insures workmen's compensation risks. Last year our company-wide costs were 19.1 cents per $100 payroll . . .

"Our production - department cost was 36.4 cents per $100 payroll, compared with manual rates of $5.79 for oil-well drilling and $1.75 for oil producing.

"Our refining-department cost was 19.5 cents per $100 payroll, compared with the manual rate of $1.65 for oil refining.

"Only one of our operating departments had a rate higher than our accounting department."

Robert L. Minckler, president of General Petroleum Corp., addressing the Greater Los Angeles Chapter of the National Safety Council.

Importance of Depletion

"Companies which produce about half of the oil in the United States . . . since 1926 have spent on wildcat exploration alone about as much money as their total allowable depletion.

"The figures do not include the even larger expenditures for the development wells which come after they've found a commercially productive field.

"Any reduction in percentage depletion would exact a heavy toll of the oil industry as we have known it—and on the whole economy of the United States. No one here would escape its effects, either personally or in his business."

T. S. Peterson, president of Standard Oil Co. of California, addressing the National Industrial Conference Board.

Victory for Everybody

"The action of the senate in passing a tidelands bill probably will be called a great victory for the South. That is rather begging the issue. It is a great victory for the nation as a whole, a victory for the people themselves, and, above all, a victory for the rights of all 48 states—not merely Southern states or coastal states.

"Through the senate action, the present congress has shown that a majority of both branches recognize that the Constitution of the United States, in its spirit as well as in its words, always must be paramount to selfish desires of persons temporarily in position to administer government

For Handling Today's Heavier Tongs...

THE NEW, LARGER, STRONGER, 12" WECO TONG LINE BLOCK

- SHEAVE EQUIPPED WITH NEEDLE BEARING.
- FORGED STEEL SWIVEL EYE.
- LINES CAN'T SLIP BETWEEN SHEAVE AND SHELL.
- BLOCKS WILL NOT SNARL OR FOUL.

The heavier tongs in use today require the extra sheave size and greater strength of this new WECO BLOCK. The extra diameter provided by the 12" sheave, reduces the bend in your line, makes it easier to lift the tongs. The machined groove has no rough edges to cut the line.

The Block is constructed extra heavy throughout. The sides are heavy steel plate and the sheave is malleable iron with webb design to minimize total block weight without sacrificing strength. Of course, it has the WECO patented drop side feature which makes it possible to string or unstring the block without using the end of the line.

Actual tests with loads many times greater than working loads assure an ample safety factor. Ask your WECO representative for complete, details and advantages of the new 12" Tong Line Block.

The 8" WECO Tong Line Block, with "Oilite" bearing is available for handling ordinary size tongs, wire line guides and for many other applications.

It's Wise to Standardize with... WECO...

WELL EQUIPMENT MFG. CORP.
Division of Chiksan Company
HOUSTON 1, TEXAS
Exclusive Sales Representative Outside Mid-Continent Area
CHIKSAN COMPANY
Brea, Calif. Chicago 3, Ill. Newark 2, N. J.
Export Sales: CHIKSAN EXPORT COMPANY, Brea, Calif. Newark 2, N. J.

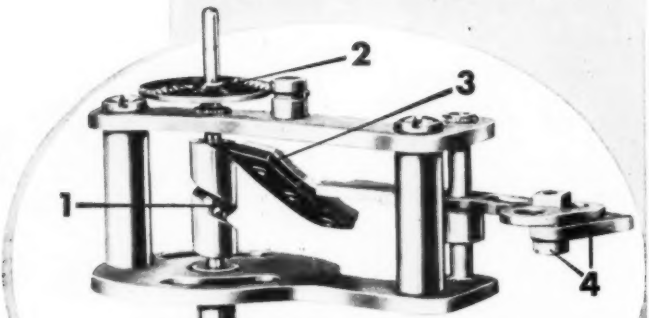
Manufacturers and Distributors of Oilfield, Refining, Marine and Industrial Equipment

an ACCO product

HELICOID

The gage that retains its original accuracy longer, lasts longer, costs less per gage, per year

The greatest achievement of the gage makers' craft—pressure gages without gears. The Helicoid movement... tested and proved in years of hard service ... is a simple cam and roller arrangement that gives long, trouble-free service.



FOUR HELICOID FEATURES

1. Stainless Steel Helicoid Roller (no gear teeth)
2. Stainless steel hair spring
3. Long Life Cam (no gear teeth)
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under that constitution—including at times the Supreme Court of the United States."

Editorial in the Shreveport Times.

Middle East's Importance

"We believe that western Europe is vital to our defense, and we have been expressing that belief by paying out billions of dollars to strengthen Europe against communism.

"Oil is vital to western Europe. Most of western Europe's oil comes from the Middle East... If western Europe is vital to us, and if Middle East oil is vital to western Europe, then it follows that the production of Middle East oil is vital to us—right now."

Charles L. Harding, director of Middle East interests of Socony-Vacuum Oil Co., Inc., speaking at Radcliffe College, Cambridge, Mass.

CALENDAR

APRIL

21-23	American Petroleum Institute, division of Transportation, pipeline conference, Black Hotel Fort Worth.
21-24	American Petroleum Institute, safety and fire-protection committees, Hotel Texas, Fort Worth.
22	National Petroleum Council, conference rooms A and B of the Interior Department Auditorium, Washington, D. C.
24-25	American Petroleum Institute, division of production, Rocky Mountain district, Gladstone Hotel, Casper, Wyo.
24-25	Indiana Gas Association, annual meeting, French Lick Springs Hotel, French Lick, Ind.
25-26	Ardmore Geological Society, field trip, east of Ardmore and south of the Arbuckle Mountains.
28-29	Independent Petroleum Association of America, midyear meeting, Deshler-Wallick Hotel, Columbus, Ohio.
30-May 2	American Institute of Electrical Engineers, District 1 meeting, Binghampton, N. Y.
30-May 2	Natural Gasoline Association of America, annual meeting, Rice Hotel, Houston.

MAY

1- 3	Southeastern Section Geological Society of America, and Southeastern Mineral Symposium, joint meeting, Hotel Roanoke, Roanoke, Va.
5- 6	National Air Pollution Symposium, Huntington Hotel, Pasadena, Calif.
5- 7	American Geophysical Union, thirty-third annual meeting, National Academy of Sciences, National Research Council, Washington, D. C.
8- 9	Texas Petroleum Research Committee, Fourth Oil Recovery conference, Austin, Tex.
8-10	Geological Society of America, Rocky Mountain section, University of Utah, Salt Lake City.
9-10	Interstate Oil Compact Commission, spring meeting, Phoenix, Ariz.
11-14	American Institute of Chemical Engineers, regional meeting, French Lick, Ind.

12-13 American Association of Petroleum Geologists, regional meeting, Mayo Hotel, Tulsa.

12-13 American Gas Association, Natural Gas Department, spring meeting, Biltmore Hotel, Los Angeles.

12-14 Annual Liquefied Petroleum Gas Association convention and trade show, Palmer House, Chicago.

12-15 American Petroleum Institute, division of refining, seventeenth midyear meeting, St. Francis Hotel, San Francisco.

13-15 Pennsylvania Gas Association, Wernesville, Pa.

15-16 American Petroleum Institute, Division of Production, Pacific Coast district, Biltmore Hotel, Los Angeles.

16 University of Kansas City, symposium on oil and gas, Kansas City.

17 Permian Basin Geophysical Society, first annual meeting, Scarborough Hotel, Midland, Tex.

19-20 American Petroleum Institute, Division of Marketing, midyear meeting, Sheraton-Plaza Hotel, Boston.

19-20 American Association of Oilwell Drilling Contractors, seventh annual safety clinic, Adolphus Hotel, Dallas.

21-23 Gas Appliance Manufacturers Association, annual meeting, Broadmoor Hotel, Colorado Springs, Colo.

26-28 American Gas Association, production and chemical conference, Hotel New Yorker, New York.

27-28 American Petroleum Institute lubrication committee, Mayo Hotel, Tulsa.

27-29 Southwestern Gas Measurement Short Course, University of Oklahoma, Norman.

28-30 Seventh annual short course in gas technology, sponsored by the Southern Gas Association, Texas College of Arts and Industries, Kingsville, Tex.

29-30 Society of Exploration Geophysicists, Gulf Coast regional meeting, Rice Hotel, Houston.

JUNE

1- 6 Society of Automotive Engineers, summer meeting, Ambassador and Ritz-Carlton hotels, Atlantic City, N. J.

2- 4 Seventh annual short course on process instrumentation, A. & M. College of Texas, College Station.

5- 6 Pennsylvania Grade Crude Oil Association, annual meeting, Hotel William Penn, Pittsburgh.

5- 7 National Oil Scouts and Landmen's Association, annual convention, Hilton Hotel, Albuquerque, N. M.

7 California Natural Gasoline Association, annual June Frolic, Rio Hondo Country Club, Downey, Calif.

8-12 Canadian Gas Association, Chateau Frontenac, Quebec.

9-14 American Petroleum Institute, midyear standardization meeting, Brown Palace Hotel, Denver.

12-13 Western Petroleum Refiners Association, regional technical and industrial-relations meeting, Broadview Hotel, Wichita.

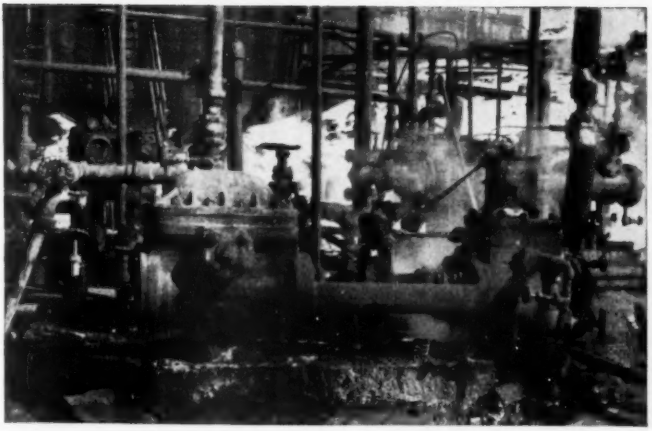
13-14 Rocky Mountain Oil and Gas Association, midyear meeting, Rainbow Hotel, Great Falls, Mont.

16-22 International Gas Conference, Brussels, Belgium.

19-20 Kentucky Oil and Gas Association, annual meeting, Hotel Lafayette and Phoenix Hotel, Lexington, Ky.

22-25 Petroleum Equipment Suppliers Association, Mark Hopkins Hotel, San Francisco.

23-24 Michigan Gas Association, annual meeting, Grand Hotel, Mackinac Island, Mich.



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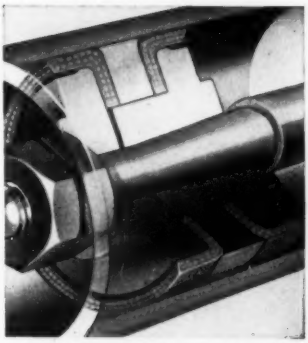

Cross section showing Pumcup installed.

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23-27	American Society for Testing Materials, annual meeting, Hotel Statler, New York.
23-27	American Institute of Electrical Engineers, summer general meeting, Nicollet Hotel, Minneapolis.

AUG.

1- 3	Wyoming Geological Association, field trip, Big Horn basin.
11-13	Society of Automotive Engineers, national West Coast meeting, Fairmont Hotel, San Francisco.
19-22	American Institute of Electrical Engineers, Pacific general meeting Westward Ho Hotel, Phoenix, Ariz.
25-27	Twelfth Annual Appalachian Gas Measurement Short Course, West Virginia University, Morgantown, W. Va.

SEPT.

3- 5	Pacific Coast Gas Association, Ambassador Hotel, Los Angeles.
8-12	Instrument Society of America, seventh national instrument conference and exhibit, Cleveland.
10-12	National Petroleum Association, fiftieth annual meeting, Hotel Traymore, Atlantic City, N. J.
11-13	American Institute of Chemical Engineers, regional meeting, Palmer House, Chicago.
25-26	Western Petroleum Refiners Association, regional meeting, Hotel Henning, Casper, Wyo.
28-30	American Association of Oilwell Drilling Contractors, annual meeting, Skirvin Hotel, Oklahoma City.

OCT.

1-3	National Association of Corrosion Engineers, South Central section, technical program and committee meetings, Jung Hotel, New Orleans.
6	Independent Natural Gas Association of America, annual meeting, Fontenelle Hotel, Omaha, Neb.
9-10	California Natural Gasoline Association, twenty-seventh annual fall meeting, Ambassador Hotel, Los Angeles.
13-15	Texas Mid-Continent Oil and Gas Association, thirty-third annual meeting, Hotel Texas, Fort Worth
13-17	American Institute of Electrical Engineers, fall meeting, New Orleans.
19	Natural Gasoline Association of America, southern regional meeting, Blackstone Hotel, Tyler, Tex.
20-21	Independent Petroleum Association of America, annual meeting, Mayo Hotel, Tulsa.
22-24	Society of Automotive Engineers, national transportation meeting, Hotel William Penn, Pittsburgh, Pa.
27-31	American Gas Association, annual convention Atlantic City, N. J.
30-Nov. 1	Rocky Mountain Oil and Gas Association, annual meeting, Cosmopolitan Hotel, Denver.

NOMADS

Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas-Fort Worth Nomads, first Monday of each month, Greater Dallas Club.

Houston Nomads, second Monday of each month, Ye Ole College Inn, Houston.

Los Angeles Nomads, second Wednesday of each month, Jonathan Club.

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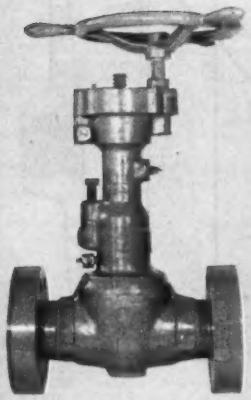

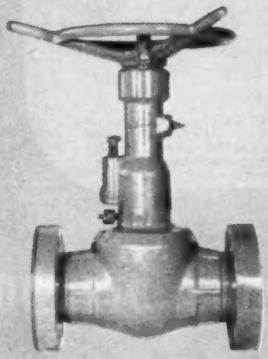

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Now Hinderliter offers you all the advantages of a compact casing head and tubing head in *one* amazing new *hook-up*. This hook-up is one of the greatest time and money savers ever introduced in well head control.

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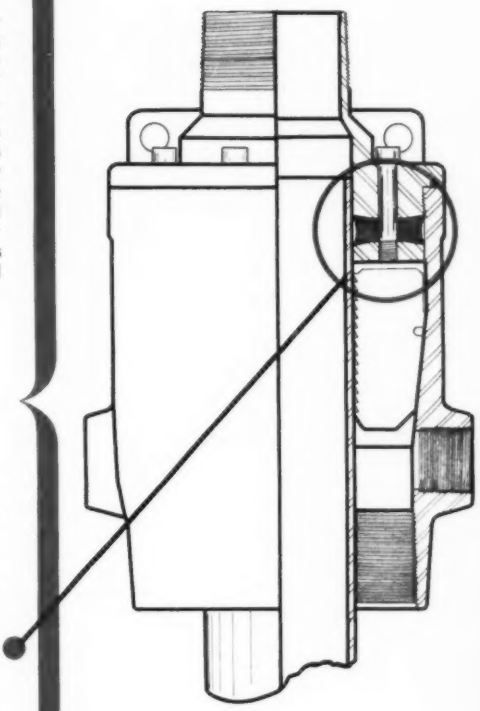

- Completely eliminates the nippling-up process. Cut off the casing, install the "Siamese" and connect the tubing head. Saves hours of valuable rig time.
- Packing can be adjusted at *any* time from the *outside* without disturbing *any* element of the hook-up.
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JOURNAL
TULSA, OKLAHOMA

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JOURNALLY Speaking

Hot Coffee

WE were sitting in a restaurant before a half-emptied cup of coffee the other day when the waitress asked if we wanted the coffee warmed up. We did, but we wondered if that was part of the service or if it would add another dime to our bill. It set us to thinking about how f r e q u e n t l y salespeople inveigle us into buying something extra just by suggesting that it might be part of the service.

Then we drove into a filling station. We weren't a bit concerned about the possible charge when the attendant wiped the windshield and checked the oil and water, nor did we feel guilty when we asked him to put air in the tires and water in the battery. Both we and the attendant understood perfectly that that was all part of the service and that all we would pay for was the gasoline.

Why are such free services taken for granted in the oil business? The only answer we can think of is competition. The oil business is the most competitive in the world. Of course there probably isn't a businessman anywhere who doesn't complain that he has too much competition, but he really doesn't know the meaning of the word unless he has been in the oil business. However, our main point is that this simple and ubiquitous evidence of keen competition ought to dispel the time-worn popular fallacy that the oil business is just a big monopoly out to milk the consumer of his last nickel. Shucks, if filling stations were restaurants you'd probably get hot coffee for free.

No Fairy Tale

SEEMS like we're always spouting off before we get the whole story. Not long ago we penned a blurb praising oil and gas companies for getting out such fine and fancy annual reports. No sooner had that item gone to press when we ran across a report that knocked us for a loop. Its opening sentence started out:

"Once upon a time, far behind the curtains of the past . . ." There was a lot more just like it, too. In fact, the whole report was written in narrative, even conversational, tone, simple to understand and fascinating to read. The necessary audited tables of figures were tucked away in the appendix, but you didn't have to study them unless you wanted to because the text of the report explained the highlights and told just what they meant in the operations of the company.

Of course, that opening line has been used before, even to the point of being hackneyed in some places, but never in a corporation's financial statement. We think it's wonderful. Here's for more imagination, more information, and more literary quality in annual reports. That rumbling you are picking up on your seismograph is a lot of old-time auditors and corporation treasurers turning over in their graves.

Earth Shaking

THAT earthquake which shook large parts of Texas, Oklahoma, and Kansas the other day caused far more excitement than damage. In Tulsa, all business was disrupted for about an hour, not because of any damage or even much scare, but because everybody tried to telephone somebody else to ask or tell about the tremor.

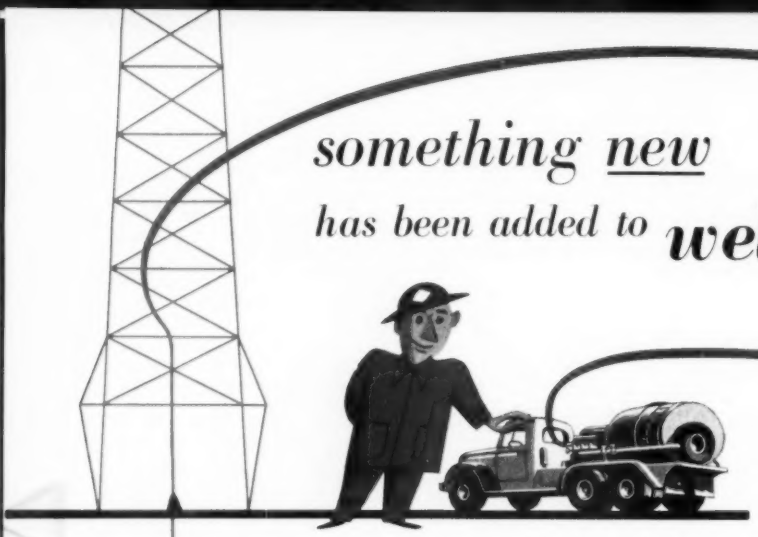
When the switchboards finally were cleared a little, the newspapers, quite logically, called all the oil and geophysical companies to find out how much of a quiver was registered on their seismographs, and then a horrid and embarrassing truth was revealed: Here in the Oil Capital of the World not a single seismograph was hooked up at the time of the quake. Very humbly the local papers carried reports from the earth-study laboratories of distant universities about the recordings made on the original type of seismograph from which the oil industry adapted its commercial geophones.

Incidentally, the most interesting reaction was from former Californians. In the past they had always pooh-poohed the idea that California ever had any earthquakes worth mentioning, but immediately they began bragging about quakes they had experienced which made Oklahoma's little shiver seem like nothing at all.

—Henry D. Ralph.

something new

has been added to ***well treating***



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ETCHING ACID—Jel-X 100 is a slightly viscous solution which has proved effective for use in limestone and dolomite formations with either fractured or vugular porosity. It is designed to etch and enlarge fractures or "vugs"; clean fractures by removing mud, silicate and feldspar materials; penetrate formation farther from the well bore than ordinary acid.

CHANNELING ACID—Jel-X 200 is a fairly viscous solution which has proved effective in limestone and dolomite with some intergranular porosity. It is designed to form channels deep into pay formations. These channels permit the entrance of acid into zones far from the well bore, reaching production that might otherwise be untapped.

STRATA-LIFT—Jel-X 300 and 400 are very viscous solutions which have proved effective in problem wells completed in dense limestone or dolomite. They are designed to open new fractures and extend old ones, and to dissolve soluble portions of the formation. Strata-lift may carry suspended sand which operates as a propping or abrading agent; needs no following jel-breaker solution.

STRATA-FRAC—Jel-X 500 is a fairly viscous fluid which has proved effective in sandstone, chert, chat and conglomerate formations. It is designed to dissolve soluble materials including silicates, paraffins and other heavy hydrocarbons; and to open new fractures or enlarge old ones. Strata-frac carries suspended sand as a propping or abrading agent; needs no following jel-breaker solution.

TEMPORARY PLUGGING SERVICE—Jel-X 700, 800, 810 and 900 are very viscous solutions which have proved effective in selective acidizing. They are designed to shut off the more permeable zones, permitting acid to be injected into the tighter formations. They are particularly useful in wells having multiple zone completions.

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THE OIL AND GAS
JOURNAL
Vol. 50, No. 50

CONTENTS FOR APRIL 21, 1952

NEXT WEEK

- The Role of Houdriforming in Petroleum Refining.
- Installation of Automatic Controls on Wells and Tank Batteries for Improved Efficiency.
- New Light on Processing Sulfur-Bearing Gases.
- Utah's Future in Oil.
- Wilshire Oil Co.'s "Land Barge" Rig Is Completely Packaged.
- Gardner Starts Drilling 5 Hours After Rig Moving Begins.
- Supply and Well-Logging Firms Find Mobile Radio a Useful Tool.
- Other Articles and Regular Features.

REGULAR DEPARTMENTS

They Say	79
Calendar of Events	80
Journally Speaking	85
Editorial	89
This Week	90
Watching Washington	106
International News	107
Personals	113
Deaths in the Industry	115
Books	154-160
On the Job	161
Engineering Reference	169
Questions on Technology	171
Refiner's Notebook	173
Modern Drilling	175
Engineering Fundamentals	177
Corrosion Control	179
Pipe-Line Construction	180
Drilling Contractors	189
Active Rotary Rigs	190
Natural-Gas News	191
Pipe-Line News	193
Refining News	196
Exploration Statistics	224
Production Statistics	225
Refining Statistics	226
Market Statistics	227
Equipment Men in News	229
Classified Advertising	230
Advertisers' Index	235

EXPLORATION—DEVELOPMENT

Pennsylvania Getting Second Look	199
Highlights of Week	199
Reports by Areas	200

NEWS FEATURES

Wyoming's 25-Discovery Record in 1951 Expected to Fall This Year	91
Conoco Plans Repressuring of Sussex Field, Johnson County, Wyoming	92
Second-Quarter Increase in Drilling Activity Seen for California	92
Prolific Deep Strike Made in California's Old Wheeler Ridge Field	92
New Oil Strike Threat Develops as WSB Drops Settlement Efforts	93
Preparations Near Completion for N.G.A.A.'s Annual Convention	93
Trend in Refinery Electrical Systems Veers to Higher Voltage	94
Microwave-Telephone Tiein Dispute Still Not Settled	95
Department of Commerce Reports Exports, Imports Down in February	95
Scientists Launch Geological Investigation of Gulf of Mexico	96
Production Workers' Wages Reported by Labor Statistics Bureau	97
Stocks of Four Major Products Reported Up From Last Year	98
OPS Rejects Penn Grade Bid for 72-Cent Hike in Crude Price	98
Alberta Legislature Approves Limited Export of Natural Gas	99
Profit From Synthetic-Fuel Plants Too Low to Appeal to Investors	100
Chapman Says Time Is at Hand to Begin Synthetic-Fuel Production	103
Bits, Tool Joints, Wire Rope Plentiful; Other Items Short	104
War Won't Cut Quality of Civilian Diesel Fuel, PAD Reports	106
World Crude-Oil Production Reaches New All-Time Record	107
Isle of Grain Refinery to Begin Operations This Spring	109
Guatemalan Minister Promises Study of Oil-Company Needs	110
Reports Say Superior Planning to Withdraw From Persian Gulf	111
New Zealand Halts Move Toward Exclusive-Dealing Stations	112

ENGINEERING - OPERATING FEATURES

Sweet-Oil-Well Corrosion ... 116
Corrosion occurs at both high and low pressures; two distinctly different types are encountered. By H. L. Bilhartz, Atlantic Refining Co.

How to Achieve an Enviable Safety Record ... 119
Three and one half years without lost-time accident at Berry Asphalt Co. By A. T. Van Pelt.

West Texas' First Sulfur-Recovery Unit ... 122
Twenty-ton per day unit first to go on stream in Permian basin area. By H. H. Jones, Sid Richardson Carbon Co., and R. A. Graff, Graff Engineering Co.

Methanol as a Hydrate Inhibitor ... 124
Hydrate formation prevented by injection of methanol in gas pipe line. By R. M. Woolfolk, Jr., The California Co.

Geomagnetic Survey in Williston Basin ... 127
Definite geomagnetic gradient to the southwest of basin; structure of Turtle Mountains inferred. By N. N. Kowanowski.

How to Interpret the Results of Drill-Stem Tests ... 130
Fluid-recovery information and reservoir engineering data can be obtained. By M. F. Manville and O. W. Ward, Johnson Testers, Inc.

High-Pressure Water in Refinery Maintenance and Construction ... 133
Water used for descaling, pipe cleaning, tube-bundle cleaning, and boring. By J. Vasey, Shell Oil Co.

Successful Water Flooding ... 141
Methodical examination of the various factors influencing water flood can eliminate poor projects. By W. W. Wilson, C. L. Brown, and K. D. Sheppard, Continental Oil Co.

Geology of the Spraberry Trend ... 157
1,223 Wells producing from Spraberry sandstone on March 1; 729,600 acres of proven producing area. By J. H. Bartley, consulting geologist.

On the Job ... In the Fields ... 161-163
Magnolia's "Bleeder-Shutoff Valve," Yale Gas Co.'s "Pipe Support Frame," Bell and Burden's "Auxiliary Skid Bar."

On the Job ... In the Plants ... 164-167
Sunray "Saving Extra Liquids," Phillips Oil's "Pressure Filters."

Engineering Reference Section ... 169
Questions on Technology ... 171
Refiner's Notebook ... 173
Modern Drilling ... 175
Engineering Fundamentals ... 177
Corrosion Control ... 179

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Baker DUPLEX Cement Wash-Down Whirler Float Shoe — Product No. 360

WHAT YOU CAN DO WITH BAKER DUPLEX EQUIPMENT

successfully cement liners, combination strings, and perform certain types of two-stage cementing.

cement blank sections of pipe below a perforated section, without any need to use auxiliary equipment.

wash out cavings ahead of the string when setting a liner. Without DUPLEX Equipment you can circulate only through the topmost perforations—with DUPLEX you can circulate clear to bottom.

you can control the amounts of materials used, and (without change) run caustic or oil, then run plastic, in sequences and quantities as desired.

you eliminate the need for auxiliary equipment (such as retainers or retrievable cementers) when you use Baker DUPLEX.

you can use DUPLEX equipment either with or without a liner hanger.

you have complete control of the liner at all times when DUPLEX Equipment is used. The liner can be raised or lowered, and is positively held down in place while cementing

a bridging ball can be dropped (after cementing) and circulation carried on above the DUPLEX Equipment without disturbing the green cement.

Baker Combination Product No. 383 with a DUPLEX Whirler Float Collar. Cement is held above the Metal Petal Basket.

How DUPLEX Equipment is made

DUPLEX Float Shoes and Collars are similar to other Baker Float Shoes and Collars in most features, but have a female left-hand thread assembly (of drillable cast iron) accurately anchored just above the Back-Pressure Valve. By means of a mating male Left-Hand Square Thread Sub, the cementing string is easily connected to (or disconnected from) the DUPLEX Shoe or Collar.

How DUPLEX Equipment Operates

In simple liner work, a DUPLEX Wash-Down Whirler Float Shoe is connected to the bottom joint and the balance of the liner is run into the well, with the last joint held in slips or clamps. A cementing string of sufficient length then is run to connect the male Left-Hand Square Thread Sub to the female left-hand assembly in the shoe, to form a quick, fluid-tight connection.

The portion of the cementing string above the liner is then run, with the DUPLEX connection carrying the weight of the liner. After cementing, the back-pressure valve prevents any flow-back of cement slurry placed outside the liner. The cementing string is then disconnected by rotating to the *right;* excess cement washed out; and the cementing string removed from the well.

Various combinations of Baker DUPLEX Equipment are used to perform more complex operations, such as cementing behind liners at different levels; cementing above and below cavities; between producing zones; and similar work.

The Baker representative or office nearest you is available to discuss proper use of Baker DUPLEX Equipment in your well completions.

BAKER OIL TOOLS, INC.

HOUSTON • LOS ANGELES • NEW YORK

BAKER

GUIDING, FLOATING AND CEMENTING EQUIPMENT

DUPLEX

The trend toward decontrol needs some heavy nudging

THE signs of decontrol of industry by the Government that are bursting out all over these days are as welcome as the flowers in spring, but they are as fickle as April weather. In these times, the Government gives and the Government takes away. An apparent trend toward decontrol one week may be offset by a swing back toward more control the next.

Right now, for example, refiners are both jubilant and dubious about the recent action of the Petroleum Administration for Defense in decontrolling tetraethyl lead—jubilant because now they can use all they want, dubious because this freedom might bring more trouble than the restrictions.

UNLIMITED use of TEL could bring on a senseless competitive octane race—unneeded by motorists and uneconomic to refiners. Decontrol should not be considered an invitation to prodigal usage. Metallic lead and other ingredients of TEL are still somewhat critical, and excessive use now would waste both lead and money and also could cause another shortage requiring controls to be clamped on again.

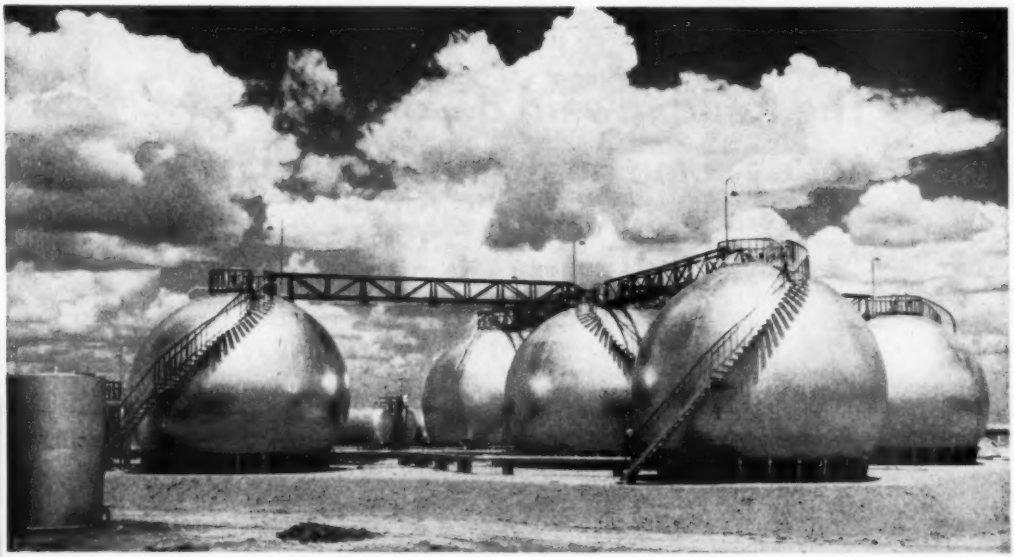
PAD took this calculated risk when it decontrolled TEL. It took the chance that the industry will not go hog wild and create a new scarcity just when supplies and demands are reaching an apparent balance. But PAD leans much more strongly toward decontrol than most of the other emergency Government agencies.

A number of other commodities have been decontrolled in recent months, and all of them are in the nature of test cases. At present the air is full of optimistic talk that all steel, except perhaps special alloys, may be decontrolled by next fall or winter. This would be good news, indeed, for the oil industry, but it would be a catastrophe if decontrol were followed by such indiscriminate use and inventory building that controls had to be slapped back on. So the trend toward decontrol will be nudged along by assurance from industry that demand will not outrun supply.

BUT decontrol of materials is one thing and decontrol of prices is quite another—in the minds of Washington bureaucrats. With its basic law up for renewal by Congress and a national election in the offing, the Office of Price Stabilization is putting on a terrific publicity campaign to scare people into demanding continuation of its present brand of rigid and detailed price controls.

Here is where industry can drill an offset to this resistance to decontrol: Convince Congress that price decontrol is just as desirable and just as feasible as materials decontrol, and that when it is evident that supply is equal to demand there is no reason under the sun for any kind of control, pricewise or otherwise.

THIS WEEK



MORE OF THIS.—New construction is increasing United States production capacity for natural-gas liquids by 100,000 bbl. daily, according to the Petroleum Administration for Defense. Since last July, PAD has approved plans for 36 processing plants with an aggregate capacity exceeding 88,000 bbl. daily. Existing-plant expansion programs will add another 12,000 bbl. daily, PAD says. Five of the new plants were finished late last year, and the rest are either now under construction or will be started soon. This picture is of storage facilities at the Snyder, Tex., gasoline plant operated by Sunray Oil Corp. for 30 companies and 60 individuals.

INTERNATIONAL.—World production reaches new peak of 12,077,000 bbl. daily, nearly 6 per cent over year-earlier figure. . . . Iraq shows 39,000-bbl. increase, with promise of greater increases to come. . . . Venezuela also sets new all-time record. . . . ¶Kent refinery of Anglo-Iranian to begin operation this spring with initial capacity of 42,000 bbl. daily. . . . ¶Reports suggest Superior soon will withdraw from exploratory operations in Persian Gulf. . . . ¶Anglo-Iranian will install catalytic cracking unit in 60,000-bbl. refinery planned for Australia. . . . ¶Iraq offers royalty crude for sale. . . .

ACTIVITY.—Production of crude and lease condensate averaged 6,364,475 bbl. daily for week ended April 12, down 22,490 bbl. daily. . . . ¶Well completions were off 69 wells for the week to 822. . . . Wildcat completions totaled 167 wells compared with 188 for previous week and 199 for same week last year. . . . ¶Rotary rigs operating in United States on April 14 amounted to 2,792 rigs, down 11 rigs from previous week but up 489 from corresponding date last year. . . .

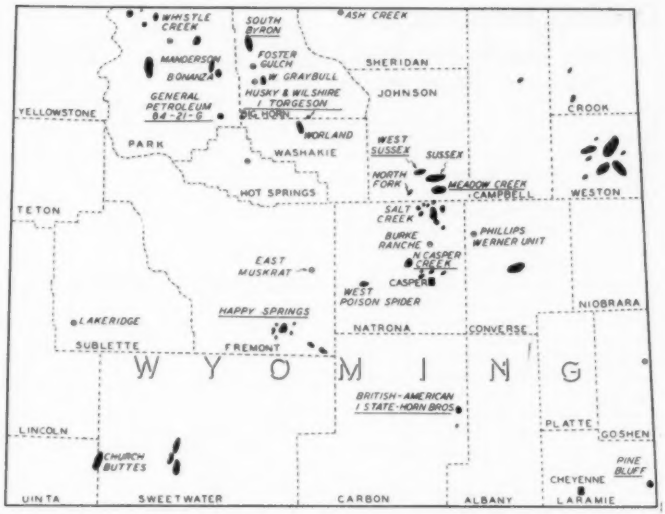
TRENDS.—Total production of crude and lease condensate in 1952 through April 12 was 35,500,000 bbl. or 5.8 per cent greater than last year. . . . An increase of almost 20 per cent in production of lease condensate accounted for about 1,660,000 bbl. of the total gain. . . .

REFINING.—Shell begins work on $7,000,000 crude-distillation unit at Wilmington refinery. . . . Unit will handle 52,000 bbl. daily. . . . ¶Humble to begin construction in September on new paraxylene plant at company's Baytown refinery. . . . ¶Trend in electrical distribution systems in refineries is toward use of higher voltage, electric association told. . . . Short-circuit protection for plant should be on a master-plan basis, Phillips engineer says. . . .

DRILLING.—Deep test of Richfield in old San Joaquin field flows at rate of 1,170 bbl. daily on test, indicating possibility that most prolific reservoir of 30-year-old Wheeler Ridge field has just been found. . . . ¶California producers see slightly higher drilling rate during second quarter. . . . ¶Wyoming search for oil this year to be even more active than that of record year of 1951. . . .

SYNTHETICS.—Liquid fuels can be made from coal at a slight profit, but private firms aren't going to trample each other in the rush to build synthetic plants. . . . An engineering study of Oscar Chapman's pet project by Ebasco Services, Inc., shows that the 14 to 16 per cent return seen as necessary to attract investment isn't attainable. . . . ¶NPC, which meets this week, is expected to disagree with many of Ebasco's figures. . . .

LABOR.—Union leaders threaten April 30 strike in petroleum industry if negotiations fail to settle wage dispute by then. . . . Announcement followed WSB decision to quit trying for settlement and toss problem back to union and company representatives. . . . A. F. of L. leader questions O.W.I.U. president's authority to speak for all oil workers. . . .



WYOMING STRIKES.—Existing pools, new discoveries, and possible new strikes are shown on this map of Wyoming. This year's discoveries are underlined; location of indicated strikes and the well names also are shown.

Wyoming Optimistic

Last year's 25-discovery record to fall in 1952; state already claims nine strikes, with seven more indicated

DENVER. — Exploratory drilling in Wyoming is proceeding at such a rapid rate and with so much success that 1952 promises to surpass last year's record of 25 discoveries of new fields or new pays.

So far this year there have been nine new discovery wells completed and seven more possible strikes are indicated.

The significant discoveries last year in the Bonanza, Manderson, Meadow Creek, and Sussex areas sparked the current exploratory and development activity in the Big Horn and Powder River basins.

Wyoming led all Rocky Mountain states in geophysical activity last year, with Freemont County the most active area, and an active exploratory program is under way at the present time.

New strikes.—Here are the nine successful wildcats completed so far this year:

Husky Oil Co. and Wilshire Oil Co. completed 1 Torgeson, northwest of Worland field, Big Horn County, for 40,000 to 50,000 M.c.f. of gas daily open flow. This Phosphoria discovery will increase the search for Phosphoria reserves in the Worland area.

Sinclair Oil & Gas Co. completed a Dakota sand new-pay discovery at Happy Springs, Fremont County. The well is in a new producing area, north of Sinclair's first discovery in this unit.

Continental Oil Co.'s new-pay discovery at Meadow Creek flowed 180 bbl. of oil daily on completion in the Tensleep. The well was drilled to 10,726 ft., deepest to be drilled in this area, and plugged back after failing in the Madison and lower zones.

Continental's West Sussex Lakota-sand new-pay discovery was completed for 240 bbl. of oil daily. The well failed in the Shannon and was taken to Lakota, which sand failed to produce at the discovery well.

Harold Barnes, Bruce Anderson, and R. L. Peterson completed a Tensleep producer along the west side of the Powder River basin in the North Casper Creek area, Natrona County. The well is the first Tensleep producer completed south of Salt Creek field.

On the east flank of the Denver basin's Cheyenne Low, Union Oil Co. completed a small discovery in the Pine Bluff area, Laramie County. In Carbon County, British-American Oil Producing Co. completed an oil strike at 1 State-Horn Brothers.

General Petroleum Corp. completed a small discovery in the Gooseberry area, Park County, in the Big Horn basin. At South Byron, Lowell & Gish completed a new gas discovery in the Peay sand.

Important wildcats. — Possible new discoveries are indicated at several wells not yet completed, particularly these:

An important discovery is indicated for the Powder River basin in the Ash Creek area, Sheridan County, considerably north of previous oil production on the west side of the basin. The well, J. Ray McDermott 1 Barry, made 2,830 ft. of 36°-gravity oil on a drill-stem test of the Shannon sand.

Carter Oil Co. is preparing to shoot the Tensleep at Burke Ranch, Natrona County, after swabbing 30 bbl. of oil daily. This is the southernmost production in Tensleep on the west side of the Powder River basin.

Continental Oil Co. is continuing to find oil, although with smaller recoveries, in Tensleep at the new-pay discovery in the "B" producing area at Sussex.

Reports from West Greybull, Big Horn County, indicate some gas and oil recovery on tests of the Dakota wildcat by Trigood Oil Co. Seaboard Oil Co. is coring in Tensleep at a Park County wildcat after the well made 20 ft. of oil and gas-cut mud on tests.

A wildcat in the East Muskrat area, Fremont County, is drilling ahead in shale after finding some shows in the Frontier. The U. S. Navy is swabbing from Tensleep at a new-pay discovery at Teapot Dome Naval Reserve.

Although not an indicated producer, an important wildcat is the Phillips Petroleum Co. Werner unit, in the central portion of the Powder River basin. The well is now in the Muddy sand coring below 13,050 ft. This Converse County wildcat found no shows in cores of sands and shales, but the outcome of the well will be of importance in determining future drilling in the central Powder River basin.

Exploratory outlook.—There has been an extensive leasing campaign throughout the northern portion of the Powder River basin during recent months following new discoveries in Pennsylvanian beds at North Fork, Sussex-Meadow Creek, Teapot, and other fields.

At the present time there is an active geophysical program through this general area of the basin, indicating that more exploratory drilling will be scheduled for the coming months.

Last year's East Salt Creek discovery by Sinclair Oil & Gas Co. has added impetus to exploration along

the flank east of known surface structures and increased geophysical activity throughout the general area.

Considerable wildcat drilling is expected in northern Johnson, Sheridan, and Campbell counties this year.

The Bonanza discovery in the Big Horn basin's east flank in the Tensleep last year was of such major importance that a spurt of development and exploratory activity is in the offing this year. The Whistle Creek and Manderson areas of Park County in the basin also expect an increased drilling program.

Operators have not had much success in the Denver basin portion of southeastern Wyoming, but seismic parties and drillers are expected to increase the exploratory program in Goshen, Laramie, and Platte counties. Geophysical prospecting is also expected to spread into the western portions of the Wind River basin this year.

Production increases.—Daily average production in Wyoming last year was 186,310 bbl. Since March 29, Wyoming's daily average production has averaged 191,000 bbl. A normal increase in production will be noted in the area during the coming summer. Production increases will be assured with the completion of greater pipeline facilities now under construction.

Plant Planned

Continental to repressure Wyoming's Sussex oil field

HOUSTON. — Continental Oil Co. will build a $1,750,000 gasoline-recovery and gas-repressuring plant in Sussex oil field in Johnson County, Wyoming, according to President L. F. McCollum.

Location of the new plant will be about 15 miles north of Midwest, Wyo., and construction is expected to start in late summer, McCollum said.

The Continental installation will be the first of its type in the immediate area. The company operates a similar plant at Lance Creek and is part owner of a natural-gasoline plant in Elk Basin.

"The Sussex field plant will enable us to recover more than a million barrels additional oil during a 20-year period through the repressuring method of injecting gas back into the producing reservoirs in the area. It will also make available for sale about 13 billion cubic feet of natural gas and will recover approximately 300,000 bbl. of natural gasoline from the compression of natural gas," said McCollum.

Sussex field was discovered by Continental in July 1948. Since then Conoco has drilled 216 wells and has invested $13,000,000 in developing the field. Producing horizons are the Sussex, Shannon, Frontier, Lakota, and Tensleep.

WEST COAST

Drilling Increase

Second-quarter completions estimated at 170 per month

LOS ANGELES.—California drilling activity during the second quarter in scheduled to be slightly higher than during the first 3 months of the year, according to the quarterly study of the Conservation Committee of California oil producers.

Allowing for wells not planned when the survey was completed, it is expected that new oil wells will average about 170 monthly during this quarter. This compares with actual oil-field completions of about 155 monthly during the quarter just completed. Total completions during the first 3 months averaged 206 monthly, as compared with 164 during the like period a year ago.

Increased drilling is planned for the expanding Honor Rancho-Castaic Hills area, which continues to show promise of being the most important field discovery of the past 3 years. Nine rigs are now at work along the 2½-mile-long production trend, which is largely under lease to The Texas Co.

The recent revival of activity in South Mountain field near Santa Paula is to be continued, and in the Eastside area of Coalinga field and at a deeper pay in Brea-Olinda field drilling is being accelerated.

Continued development at present rates is expected to add 8 wells per month to Ventura Avenue field and 20 to San Ardo field.

Development in the Wilmington Harbor properties of the city of Long Beach is being resumed after a 6-week shutdown. The holiday was ordered by the harbor department in order to arrive at a cheaper method of providing bell-hole protection against earth slippages at the 1,500 to 2,300-ft. levels. Seven rigs are being put to work on city-owned properties by Long Beach Oil Development Co. and one will be kept busy by Richfield Oil Corp.

The South Mountain activity is being expedited by use of air drilling in the upper formations. Until recently cable tools were used because of severe mud losses in drilling the first 500 to 1,000 ft. of hole. To cut the time and cost of this drilling, Shell Oil Co. now is using rotaries and substituting compressed air for mud to remove cuttings.

Offshore-Lease Bids Asked

VENTURA.—The California Lands Commission has asked for bids on a 960-acre block of submerged lands lying off West Montalvo field, 10 miles south of Ventura. Bids are to be opened on May 28.

Standard Oil Co. of California has slowly been developing the field since its discovery in 1947, having completed 12 producers to date. Under terms of the interim agreement with the federal Government, the state may enter into leases with oil operators for drilling in submerged lands when it can be shown private operations on shore are causing drainage.

Important Strike

Richfield deep test flows at rate of 1,170 bbl. daily

LOS ANGELES. — Wheeler Ridge field on the southeast end of San Joaquin Valley has been producing oil from shallow horizons for 29 years, but it is highly possible its most important reservoir has just been discovered.

Richfield Oil Corp., after 15 years of subsurface geologic study and the drilling of several exploratory wells in the area, apparently has made an important discovery with the completion of a wildcat which produced at the rate of 1,170 bbl. daily on a 3-hour gage. Because of lack of storage the pool opener then had to be pinched back.

The 9,757-ft. test was completed in 157 ft. of producing sand believed to be of Eocene age. The flow of 35°-gravity crude was made on a 17/64-in. choke with a 2,800-psi. tubing pressure. Gas production was estimated at 1,500 M.c.f. daily. The wildcat, 85-29 Kern County Land, is in NE SE 29-11n-20w, or about ¼ mile south of nearest shallow production.

Although several deep tests have been drilled on the shallow structure and nearby, it is believed that in the immediate vicinity of the discovery only two were carried deep enough to test Eocene possibilities. These were drilled by Richfield in 1938 and 1940 in Section 28, about ¾ mile east and southeast of the discovery.

Shallow Wheeler Ridge oil production, entirely from Miocene formations, was discovered in 1923. First production was from the Santa Margarita sand at 2,200 ft. Later three other sands above 4,500 ft. were added. Currently shallow production is owned largely by Richfield and Standard Oil Co. of California.

Richfield holds about 2,600 acres under lease in the immediate vicinity of the discovery, principally lands of Kern County Land Co. The company's pipe-line system which brings San Joaquin and Cuyama Valley crudes to its Los Angeles refinery is less than 1 mile from the well.

New Oil Strike Threat

WSB drops efforts to settle dispute, asks resumption of negotiations; labor says failure will mean April 30 strike

WASHINGTON.—The Wage Stabilization Board temporarily bowed out of the oil wage dispute last week and urged the companies and unions to make new efforts to reach agreement.

The unions announced that they will negotiate for another 2 weeks but if there is no agreement by April 30 they definitely will strike.

These announcements followed a conference April 16 between WSB and representatives of several companies at which the board surveyed possible procedures which might prove more acceptable than the "pilot" hearings which had already proved futile.

The companies had refused to participate in a pilot hearing in St. Louis because the board would not assure them that the hearings would not lead to company-wide and nation-wide bargaining, which they suspect is one of the aims of the C.I.O. Oil Workers International Union.

In a brief session after discussions with the companies the board, by a vote of 10 to 2, requested the parties to the various disputes to resume collective bargaining at once in a "mutual effort in good faith" to reach settlements. Both sides were asked to keep the board advised of the progress of the negotiations and on its part the board promised that any agreement reached will be promptly considered.

The votes opposing this procedure were cast by the A. F. of L. representatives in the labor group.

Strike threat.—Following this conference, O. A. Knight of Denver, president of the Oil Workers International Union, C.I.O.; J. J. McKenna of Whiting, Ind., representing independent unions, and O. V. Clover of East St. Louis, Ill., representing A. F. of L. oil industry locals, issued a statement saying:

"We have delayed a national oil strike three times since March 3, at the request of the Government. The original March 3 deadline was set after 5 months of fruitless collective bargaining.

"We are now asked to postpone our strike again. We are reluctantly agreeing to one final postponement," they added.

"We will negotiate immediately with any company which is willing to negotiate. We will continue to negotiate for 2 weeks.

"If, by April 30, we have been unable to negotiate satisfactory wage settlements, we will strike. Involved in the strike will be a substantial portion of the oil industry and many key natural-gas pipe lines."

Union squabble.—Meanwhile, the American Federation of Labor pricked the balloon of Knight's claim that he represented the oil workers in all unions and disavowed the authority of O. V. Clover to speak for A. F. of L. workers. Clover was a member of the "united front" organization set up by Knight to press the union's demands.

In a letter to WSB Chairman Nathan P. Feinsinger, J. A. Brownlow, president of A. F. of L. Metal Trades Department, charged that many of the disputes certified to the board by the C.I.O. were "pseudo and ersatz" and designed to impose nation-wide bargaining on the oil industry.

"By creating these 'disputes,'" Brownlow told Feinsinger, "it will use this petroleum panel procedure as evidence of industry-wide bargaining after the Wage Stabilization Board has been put away in moth balls. They will argue the Government established industry-wide bargaining by this procedure."

Program Completed

N.G.A.A. getting set for annual meeting at Houston

HOUSTON.—The thirty-first annual convention of the Natural Gasoline Association of America will get under way at the Rice Hotel here next week, April 30-May 2.

The first two mornings of the 3-day meeting will be taken up with forums on corrosion, extraction and separation calculations, gathering systems, traffic, safety and personnel, fractional analysis, operations, and L.P.G.

General sessions will be held in the afternoons. John F. Lynch, N.G.A.A. president and head of La Gloria Corp., Corpus Christi, will open the first general session April 30, then yield the floor to Skelly Oil Co.'s Joe F. Wood, chairman of the technical committee, for his "Report to the Industry." Presentation of the Hanlon award and the subsequent award address will follow Wood's report.

Thursday's general session will feature an address by Hines H. Baker, president of Humble Oil & Refining Co., Houston, on "Our Greatest Asset." Guy C. Kiddoo, vice president of the First National Bank of Chicago, will speak on "Natural Gasoline Money, Credit, and Profits."

J. H. Dunn, president of Shamrock Oil & Gas Corp., Amarillo, will serve as moderator on Friday morning, May 2, for a forum during which executives and operating men can question leading authorities on processing, production, and operating trends. Another feature of this year's meeting will be the dinner and entertainment scheduled for Thursday evening by the Natural Gasoline Supply Men's Association.

Technical papers. — Technical papers scheduled for presentation at the meeting include:

"Use of Surface Active Agents in Cooling Tower Water Treatment," W. F. Oxford, Jr., Sun Oil Co.; "Methods and Costs of Treating Corrosive Gas-Condensate Wells," T. S. Zajac, Shell Oil Co., New York; "Constant Volatility Ratio Method for Quick Estimation of Fractionators," E. N. Pennington, F. H. Poettmann, and K. H. Hachmuth, Phillips Petroleum Co., Bartlesville, Okla.; "Engineering for Safety," G. W. McCullough, Phillips, Bartlesville; "Problems in Producing and Gathering High Pressure Gas," Roy A. Schuster, The Chicago Corp., Corpus Christi.

"The Design and Maintenance of Low Pressure Gathering Systems," C. I. Ritter, Continental Oil Co., Houston; "Development of Theory and Charts for Absorption Stripping Factor Method," R. L. McIntyre, R. O. Shelton, and K. H. Hachmuth, Phillips, Bartlesville; "The Training of Analysts," Joe Wood, Skelly Oil Co., Pawhuska; "Gas Turbine Driven Compressors," John Eichelman, El Paso Natural Gas Co., El Paso, Tex.; "Absorption-Stripping Factor Method for Fractionator Design," Shelton, McIntyre, and Hachmuth, Phillips; "Absorption-Stripping Factor Method Applied to Absorbers, Stills, and Similar Equipment," B. J. Ferro, H. R. Legatski, and Hachmuth, Phillips, Bartlesville.

"The Tank Car Outlook," Richard H. Lamberton, Defense Transport Administration, Washington; "The Railroad Viewpoint on Services and Charges for LP-Gases," C. G. Hayes, Texas & Pacific Railroad, Dallas; "Absorption and Dry Distillation," Rex Lane and B. J. Thompson, Warren Petroleum Corp., Tulsa; "Aspects of Excavated Underground L.P.G. Storage," R. L. Loofbourow, Mine Contracting Department, E. J. Longyear Co., Minneapolis.

"Problems Encountered in the Installation and Operation of Underground Storage in Salt Formations," by Wharton A. LeBlanc, Hercules Petroleum Corp., Amarillo, and G. H. Billue, Security Underground Storage Co., Wichita Falls, Tex.; "Transportation of LP-Gas," Richard H. Lamberton, Defense Transport Administration, Washington; "They Still Make Mistakes," A. J. Miller, Phillips, Bartlesville.

Dow to Start New Center

FREEPORT, Tex.—Construction of Dow Chemical Co.'s eight-building laboratory and research center near Plant B, Velasco, will begin this month and be completed within 15 months.

Southwestern Construction Co., Houston, holds contract for construction of the center. MacKie and Kamrath, Houston, are architects.

P.E.S.A. OFFICERS.—Heading activities for the coming year for the Petroleum Electric Supply Association will be, left to right, R. C. Stueve, Electric Supply Co., Tulsa, president; H. L. Renking, Electric Machinery Manufacturing Co., Minneapolis, reelected secretary-treasurer; and H. L. Housley, Automatic Electric Sales Corp., Dallas, chairman of the board. Directors elected at the meeting in Tulsa last week include G. B. Jamison, Crouse-Hinds Co., Houston; E. C. Nelson, Hubbard & Co., Kansas City; W. T. Thompson, Warren Electric Co., Houston; J. W. Rondel, General Electric Co., Syracuse, N. Y.; and E. N. Jolliff, Crouse-Hinds Co., Tulsa.

Refinery Electrification

Trend is toward use of higher voltage, Shaw tells meeting of P.I.E.A., P.E.S.A.; master plan for whole plant urged

TULSA.—The trend in modern refinery electrical distribution systems is definitely toward higher voltage systems, T. R. Shaw, of Phillips Petroleum Co., Bartlesville, Okla., said here last week.

Shaw, chief electrical engineer of Phillips' refining department, addressed the twenty-fourth annual conference of the Petroleum Industry Electrical Association and the Petroleum Electrical Supply Association.

The most economical voltage for the electrical distribution system in small to medium-size refineries is generally 4,160 volts, he said, while the economic distribution-system voltage for large processing plants is usually 13,800 volts. He pointed out that higher voltages allow simplification of the electrical system, adding to operation efficiency.

Careful selection of this supply voltage is extremely important, he emphasized, in that many refineries have outgrown their original primary distribution systems. Installation of additional equipment is both time-consuming and uneconomical, he said.

Electric motors.—Studies of electrical systems show that it is nearly always less expensive to operate all motors 200 hp. and smaller on 480 volts, and above 200 hp. at 4,160 volts, Shaw said. For very large systems utilizing motors of 2,000 or more horsepower he said that most economical voltage is probably between 7,200 and 13,800.

Shaw based his conclusions on location of step-down transformers close to the motor installations.

Short-circuit protection, said Shaw, should be designed on a master-plan basis for the whole plant, not just for individual equipment in isolated application. There are, he said, a great many refineries operating with wholly inadequate short-circuit protection.

Three basic sources of short-circuit current are generators, synchronous motors and condensers, and induction motors, he said. Great care should be taken for protection of this equipment, he said, since considerable damage can result from short-circuits.

Conduit system.—Direct burial cables are probably the best answer to the transmission problem in most refineries, Shaw said. Although economical to install and maintain, he said, the overhead conduit system is not desirable since it is extremely vulnerable in case of fire.

The underground conduit, manhole, and cable system is most attractive from the operating and maintenance standpoint, he said, but often cannot be justified economically.

Standardization urged.—Glen Ladd, chief electrical engineer, Sinclair Pipe Line Co., directed attention to the need for standardization of certain features of electrical equipment in order to achieve uniformity of dimensions and smooth rectangular shapes. Such standardization would facilitate oil company designing, he said.

The result would be better appearance and more compact installa-

TO HEAD P.I.E.A.—New officers of the Petroleum Industry Electric Association are shown here following their election at the association's annual meeting last week in Tulsa. Front row, left to right, are H. G. Pegues, United Gas Pipe Line Co., Shreveport, president; W. E. Church, Shell Oil Co., Los Angeles, vice president; and E. E. Comstock, Phillips Petroleum Co., Bartlesville, secretary. In the back row are K. P. McCord, Gulf Oil Corp., Pittsburgh, director; A. L. Stegner, Tennessee Gas Transmission Co., Houston, retiring president; and Hezzie Clark, Humble Pipe Line Co., Houston, director.

tion of equipment. This objective could be attained through the cooperation of oil companies, national electrical code authorities, and electrical equipment manufacturers. Safety provisions of present equipment are regarded by Ladd as satisfactory.

C. B. Lester and C. A. Compton, Mid-Valley Pipe Line Co. predicted that two-man maintenance of a 1,000-mile microwave system is a coming possibility. They forecast that their microwave communication system will be running next year close to 99 per cent in continuity even allowing for power outages.

No Settlement

Microwave-telephone tiein with Bell not yet definite

TULSA.—Negotiations between the Bell telephone system and several pipe-line companies for "terminating" company-owned microwave voice systems through telephone switchboards were continued during the meeting of the Petroleum Industry Electric Association here last week but failed to reach final conclusion.

This has been a bone of contention between pipe lines and the telephone company for some months, and the oil industry had hoped that a complete agreement would be announced at the P.I.E.A. meeting. It is understood that agreement has been reached in principle but that Bell prefers to make separate agreements with each pipe line whereas the industry was seeking a general policy covered by a filed tariff or standard contract form.

The controversy came to a head in Houston last fall when Transcontinental Gas Pipe Line Corp. and Humble Oil & Refining Co. filed a complaint with the Department of Public Service of the city of Houston against Southwestern Bell Telephone Co.

Both companies have constructed private microwave communications systems along the routes of their pipe lines, terminating in their Houston offices. Both companies also have private branch exchanges in their offices, which are owned and maintained by Bell. Bell refused to interconnect the two terminals to permit company employes to talk from the Bell instruments on their desks over the microwave system to distant company offices.

The Houston hearings last fall were confined to the jurisdiction of the city department. On March 31, just before the department scheduled hearings on the merits of the complaint, both Transcontinental and Humble agreed to dismissal of the case, explaining that a satisfactory voluntary agreement with Bell was expected shortly.

The pipe lines pointed out that for years Bell has had a standard contract form under which oil, transportation, and other companies having private land-wire telephone systems may terminate them through P.B.X. boards owned and installed by Bell. They contended that microwave systems should be treated similarly.

Imports Drop

Exports also show decline during month of February

BOTH imports and exports decreased in February, according to data released by the Census Bureau of the Department of Commerce.

Total imports into continental United States averaged 929,000 bbl. daily in February compared with 976,000 bbl. daily in January and 923,000 bbl. daily in February 1951.

Crude imports were off about 27,000 bbl. daily. The largest decrease was in receipts of crude from Venezuela, down 32,400 bbl. daily. Crude from Colombia was 14,400 bbl. daily less in February, and West Coast receipts from British Borneo dropped 10,600 bbl. daily. The only important increase for the month was reported for Saudi Arabia, up 29,300 bbl. daily for the highest average since last July.

Imports of residual fuel averaged 409,000 bbl. daily in February, down about 8,000 bbl. daily from January but greater than any other month since February of last year.

Total exports, excluding shipments to territories, averaged 356,000 bbl. daily compared with 366,000 bbl. daily in January and 233,000 bbl. daily in February of last year.

Exports, excluding shipments to territories, climbed above 500,000 bbl. daily for August and September of last year but have declined each month since that time.

The largest decrease for February was recorded for kerosine, down to 7,400 bbl. daily compared with 24.2 bbl. daily in January. Smaller decreases were reported for gasoline and distillate fuels. Increases for February included gains of 2,000 bbl. daily for crude, 4,700 bbl. daily for residual, 5,900 bbl. daily for lube oils, and 7,000 bbl. daily for all other products.

IMPORTS INTO CONTINENTAL UNITED STATES
(Thousands of barrels)

	Feb. 1952	Jan. 1952	Feb. 1951
Crude—			
Mexico	775	1,022	1,013
Colombia	1,094	1,616	1,146
Venezuela	8,621	10,220	7,948
Kuwait	1,650	1,570	1,407
Saudi Arabia	1,723	932	1,098
Borneo	109	448	85
Canada	111	101	1
Total crude	14,083	15,909	12,698
Daily average	486	513	454
Products—			
Residual fuel	11,861	12,938	12,103
Other products	989	1,405	1,042
Total products	12,850	14,343	13,145
Daily average	443	463	469
Total all oils	26,933	30,252	25,843
Daily average	929	976	923

EXPORTS*
(Thousands of barrels)

	Feb. 1952	Jan. 1952	Feb. 1951
Crude	2,211	2,303	2,471
Gasoline	2,132	2,552	1,092
Kerosine	216	750	125
Distillate fuel	1,642	1,870	638
Residual fuel	1,847	1,830	644
Lube oils	1,379	†1,293	950
Other products	902	746	600
Total all oils	10,329	11,344	6,520
Daily average	356	366	233

*Excludes shipments to territories. †Revised.

Bayou System Sale Talked

NEW YORK.—Paul Ryan interests sponsoring the United States Pipe Line Co. and Coastal Products Pipe Line Co. projects were reported to be negotiating for the purchase of the Bayou Pipe Line System.

If the Bayou system were bought, the pipe would be removed for installation on laterals for the United States Pipe Line Co. project. The Bayou system has an 8-in. and 10-in. line from Houston refining areas to the Plantation Pipe Line Co. terminal at Baton Rouge, La.

The Coastal Products Pipe Line Co. plan proposes to transport products to Baton Rouge for the refining interests whose shipments are now being transported through the Bayou System. To provide for the increasing products traffic between the Houston area and Baton Rouge, Coastal has proposed to build a 260-mile, 20-in. product line between these two points.

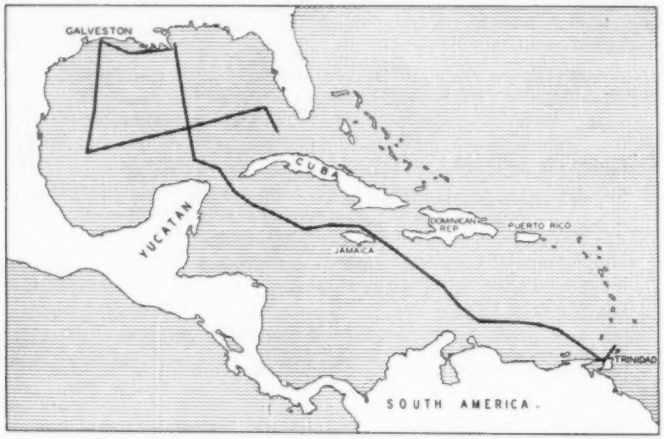
Negotiations are being conducted for L.P.G. shipments from the Longview, Tex., and Shreveport, La., areas to Nashville, Tenn., or possibly further eastward through the proposed United States Pipe Line Co. project which would originate in the Beaumont, Tex., area.

West Coast Line Approved

West Coast Pipe Line Co. plans for a major crude-oil line from West Texas to California have been approved by the Petroleum Administration for Defense, Burt E. Hull, chairman of the board of the company, announced last week.

Hull said construction is expected to start in the second half of this year on the 986-mile, 20 or 22-in. line, which will run from Snyder, West Texas, to Norwalk, Calif. Initial throughput of 180,000 bbl. daily is planned. *(See The Oil and Gas Journal, April 14, page 102.)*

The project will be financed according to present plans without shipper participation in the ownership, Hull said.



ROUTE OF THE EXPEDITION.—Heavy line shows the route to be followed by the Lamont Observatory research vessels. The craft were scheduled to leave Trinidad April 15.

Gulf Secrets Sought

Scientists set out on expedition to determine thickness of sedimentary layer, identify underlying basement rocks

Dahl M. Duff

INFORMATION of possible future value in offshore oil exploration is promised by a program of coring and geophysical measurements to be carried out in the Gulf of Mexico during the next month by a party of scientists representing the Lamont Geological Observatory, which is affiliated with Columbia University.

The work is aimed at determining the thickness and character of the sedimentary layer and the nature of the basement rocks.

The measurements are of considerable potential value to the petroleum industry since they promise a substantial contribution to the basic scientific knowledge upon which oil exploration of this region is based.

The measurements will be taken from the Atlantic and the Albatross, two vessels of the Woods Hole Oceanographic Institution. Previous deep-sea coring has been done in the Mediterranean and particularly the North Atlantic. The studies in the North Atlantic gave new information on the effectiveness of turbidity currents as agents of erosion which are sufficient to account for the long-puzzling Hudson Submarine Canyon *(A.A.P.G. Bulletin, March 1952, page 489)*.

Cruise plans.—The party now at work in the Gulf of Mexico is headed by Dr. Maurice Ewing, director of the Lamont Observatory. The group was scheduled to leave April 15 from Port of Spain, Trinidad.

The ships will put in at Galveston for a few days about May 1. During that time, representatives of the petroleum, mineral, and geophysical industries will be welcome aboard the ships, and the sediment-coring apparatus, seismic refraction equipment, and apparatus for sampling and processing deep-water samples for age determination by Carbon 14 will be available for inspection.

Dr. Ewing said that although the time available for the work in the Gulf of Mexico is extremely limited, the group would be glad to consider any suggestions for alteration of the proposed track of the investigations. Information about the Galveston visit may be obtained from Dr. Milton B. Dobrin, Magnolia Petroleum Co., Dallas; Dr. Nelson Steenland, Gravity Meter Exploration Co., Houston; or Dr. Ivan Tolstoy, Stanolind Oil & Gas Co., Tulsa.

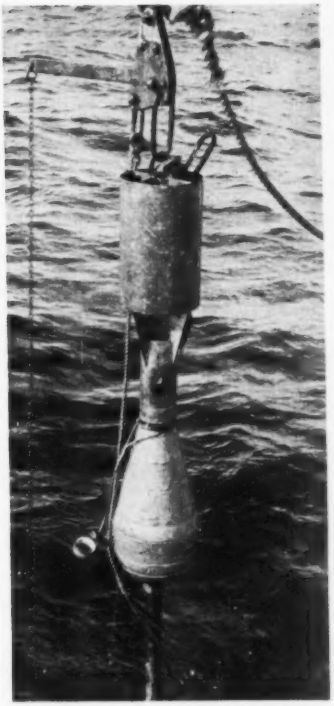
Scientific studies.—During the 33-day cruise, seismic refraction profiles will be made at about 22 stations, mostly in the Gulf of Mexico. At each station, thickness and nature of the sedimentary layer and nature of the basement will be determined. All four of the basins crossed will be sampled, but the principal emphasis will be on determining the geologic structure of the Gulf.

It is hoped to measure depth to basement in the main basin of the Gulf, and efforts will be made to trace this basement surface under the Continental Shelf if possible. At least one of the shoals at about the 80-

EXPEDITION PLANS, APRIL 15 TO MAY 18

	Days at sea	Miles	Seismic refraction stations	Sediment core stations	Carbon 14 stations	Days of topographic detail	Bathythermograph lowerings	Hydrographic stations
Port of Spain to Yucatan Channel, April 15-26	11	1,600	3	12	3	3	220	3
Yucatan Channel to Mississippi Delta, April 26-May 1	6	600	5	4	1	1	140	1
Mississippi Delta to Galveston, May 1-4	3	600	5	4	1	½	100	1
Galveston to Key West, May 8-18	10	1,000	9	4	1	½	80	1
Total	30	3,800	22	24	6	5	540	6

UNDERWATER CAMERA.—This shot of an underwater camera going over the side of the research ship was made during similar studies carried out in the Atlantic Ocean.



IMPORTANT DEVICE.—This Stetson coring tube will be a principal tool of the ocean-research expedition. In this position, ready for lowering, may be seen the lead weights, guide vanes, and tripping mechanism.

fathom (480-ft.) depth contour will be studied.

Sedimentary cores will be taken at 22 points along the cruise route. The plans call for attempting to correlate these cores with the general theory of deep-sea sedimentation which has evolved during the past 2 years. Of particular interest, Dr. Ewing said, will be the central and western basins of the Caribbean, the Bartlett Deep, the Yucatan Basin, the Sigsbee Deep, and the steep continental slopes off Campeche Bank, Louisiana, and Western Florida.

Large water samples for determination of age (i.e., the time since the water was in contact with the atmosphere) will be made at six places. At least one station, with samples at still depth and at bottom, will be taken in each of the four basins traversed. It is hoped to measure the time for progressive passage of the bottom water from one of these basins to the next. This measurement is expected to provide the basis for estimating heat flow per unit area of ocean floor, one of the most significant factors in studying the contrast in oceanic and continental crustal structure.

Topographic details will be examined of the sills over which the ponded turbidity flows of the Grenada Trough and the Colombian Basin spill into the Venezuela Basin. It is estimated that 540 bathythermograph lowerings will be made for controlling the acoustic measurements and adding to the general knowledge of surface layer oceanography in the area. Six hydrographic stations will be made, with emphasis on the deeper water, for control of the Carbon 14 ages and for estimation of the flow of heat into the bottom water inside each basin.

Louisiana Flaring to Decline

BATON ROUGE.—The major portion of the casing-head gas now being flared in Louisiana will be utilized by the end of 1953, according to a survey just completed by the state Department of Conservation.

Seventy fields in the state were found to have been flaring more than 1,000 M.c.f. daily during August 1951 for a total of 225,360 M.c.f. per day. Practically all these fields are in South Louisiana.

The 16 operators in these fields reported to the commission that they have projects now under way or planned for completion during this year or next which will utilize 163,450 M.c.f. per day of this gas.

Several of the companies stated that pipe-line connections or additional compressor facilities are now being installed or are under active negotiation. Several others who could not report specific plans for gas utilization declared that the problem is being studied but no definite program has been decided upon as yet.

ECONOMICS

Production Wages Vary

Average straight-time hourly earnings for 112,600 workers stood at $1.37 to $2.82 last fall; Californians best paid

WASHINGTON.—Average straight-time earnings for key workers in the production branch of the oil industry averaged from $1.37 to $2.82 per hour in October and November of 1951 for the oil nation as a whole.

These figures were developed from a survey by the Bureau of Labor Statistics and cover 112,600 of the estimated 184,000 persons then engaged in drilling and production operations for employers with eight or more workers.

The types of activities included were exploration, drilling, well operations and maintenance, including contract drilling and the building, repairing, and dismantling of rigs and derricks.

The lowest average hourly wage was paid part-time pumpers, the highest went to rig builders. Average pay for about half of the jobs ranged from $1.59 to $1.88 an hour. These included the three occupations with the largest number of workers—full-time pumpers, rotary floormen, and roustabouts. In three other classifications — rig builders, tool pushers, and rotary drillers—averages were above $2 an hour.

Regional variations.—Half of the employes covered by the survey were located in Texas and Oklahoma and a fifth in California and Louisiana. Regional variations in wages were

Average Hourly Wage Excluding Overtime and Night Work

Occupation—	Number of workers	Average hourly earnings
PRODUCTION		
Derrickmen	9,975	$1.72
Drillers, rotary	11,033	2.20
Enginemen, rotary	5,047	1.64
Floormen, rotary	22,562	1.62
Mechanics, maintenance	2,380	1.88
Pumpers, full-time	27,117	1.66
Pumpers, part-time	2,447	1.37
Rig builders	463	2.82
Roustabouts	19,542	1.60
Tool pushers	3,026	2.64
Truck drivers	4,127	1.48
Light (under 1½ tons)	573	1.59
Medium (1½ to and including 4 tons)	1,831	1.43
Heavy (over 4 tons, trailer type)	1,345	1.50
Heavy (over 4 tons, other than trailer type)	528	1.46
Welders, oil field	792	1.83
OFFICES—WOMEN		
Bookkeepers, hand	821	1.62
Clerks, payroll	303	1.38
Stenographers, general	2,375	1.41
Typists, class A	410	1.36
Typists, class B	353	1.03

found to be extremely wide, with the highest rates in California, followed by the Mountain states and Louisiana.

The lowest wages were paid mainly in Kentucky and West Virginia, and below average rates were reported for the Middle Atlantic states. In Texas there were substantial differentials in wages between the northern and southern sections of the state, to the advantage of the latter.

Average wages paid in California ranged from $1.84 an hour for roustabouts to $3.51 for tool pushers, with no average available for rig builders. In the Mountain states the range was from $1.57 for drivers of trailer trucks over 4 tons to $2.72 for tool pushers, again with no figure for rig builders.

Wages in North Texas ranged from $1.08 for part-time pumpers to $2.16 for drivers of heavy trailer trucks. In South Texas the range was from $1.20 for drivers of medium trucks to $2.70 for tool pushers, with differentials between these averages for the east and west. The averages for the state as a whole ran from $1.30 for drivers of medium trucks to $2.63 for rig builders.

Other areas.—Averages for other areas ran as follows: Louisiana, $1.18 for drivers of medium trucks to $3.12 for rig builders, with some differentials between northern Louisiana and the Gulf Coast; Mid-Continent, $1.25 for part-time pumpers to $2.44 for tool pushers, with no figure for rig builders; Great Lakes, $1.30 for part-time pumpers to $2 for tool pushers; Kentucky-West Virginia, $1.03 for drivers of heavy trucks other than trailer to $1.92 for tool pushers; Middle Atlantic states, $1.05 for drivers of medium trucks to $1.67 for tool pushers.

The figures compiled by the bureau are for straight-time day work and do not include premium pay for overtime and night work.

Long work week.—The bureau found that with the emergency expansion in oil production a 56-hour work week was in effect for a majority of employes in the Mid-Continent and Mountain states, with a 40-hour week most common in California and the Middle Atlantic area. Work schedules in Texas and Louisiana were about equally divided between the two.

Average straight-time hourly earnings for workers in the production branch, including averages for women in office occupations, as of last October and November, are shown in the accompanying table.

Exports Up Sharply

WASHINGTON.—Exports of major petroleum products climbed to an average 185,600 bbl. daily during the week ended March 21 in sharp recovery from the low levels of the two preceding weeks, according to figures released by the Petroleum Administration for Defense.

As compared with the week ended March 14, shipments of aviation gasoline, motor gasoline, and distillate showed substantial increases, while those of kerosine and residual declined.

Average daily exports of the individual products during the week ended March 21 as compared with the preceding week and the average for the 4 weeks ended March 21, in thousands of bbl. are shown in the accompanying table.

	Week Ended— Mar. 21	Mar. 14	Average 4 weeks
Aviation gasoline	33.1	16.3	39.2
Motor gasoline	11.7	2.6	14.8
Kerosine	10.3	16.9	14.2
Distillate	66.3	21.1	42.4
Residual	64.2	76.7	57.8
Total	185.6	133.6	168.4

Markets Changing

Total stocks up from last year, but districts vary

PRIMARY inventories of four major products on April 5 were about 5.8 per cent greater than at the same time last year, but the lack of uniformity in increases by districts has resulted in changes in product markets.

Major-product stocks in districts east of California are 25,771,000 bbl. greater than last year—a gain of 12.6 per cent. Stocks in California are down 11,307,000 bbl. or almost 26 per cent.

Soft product markets in District 2 have resulted from relatively large inventory surpluses at the end of the high-demand season. In this district major-product stocks are up 12,023,000 bbl. from last year for a gain of 16.9 per cent. By products, the increases over last year were: gasoline, 11.1 per cent; kerosine, 27.5 per cent; distillate, 25.3 per cent; and residual, 57.3 per cent.

The degrees of softness in product markets in the district follow closely the percentage increase in stocks. Residual fuel, with the greatest percentage increase in stocks was soft on the Group 3 market even during the winter months. The gasoline market, while still considered soft, is showing some signs of improvement.

A check of the weekly American Petroleum Institute stock figures indicates that the relative stock positions were changed slightly by the additional terminal inventories included by the change in definition of primary stocks. District 2 stocks on March 29 were 15.4 per cent greater than last year on the old method of reporting but were up 16.2 per cent when the additional terminal stocks were added to both current and last year's inventories.

New reporting basis.—Under the new basis of reporting, 15,530,000 bbl. of additional major-product stocks were included in the United States totals for March 29 of this year compared with an upward revision of 15,013,000 bbl. in the data for the corresponding week last year.

Most of the new terminal stocks are on the East Coast. For all four products, District 1 accounted for 60.9 per cent of the additional 15,530,000 bbl. Net additions in District 2 represented 18.4 per cent of the total while Districts 3 and 5 accounted for 10.9 per cent and 9.8 per cent respectively. No changes were made in District 4 stocks.

The following is a tabulation of net additions to stocks by districts under the new method of reporting. Data are in thousands of barrels from reports for March 29, 1952.

Districts—	Gasoline	Kerosine	Distillate	Residual
1	4,834	1,151	2,506	970
2	2,194	209	358	98
3	1,390	90	160	43
4				
5	767	11	404	345
U. S.	9,185	1,461	3,428	1,456

No Price Hike

Penn Grade men lose round, to approach PAD this week

WASHINGTON. — Representatives of the Penn Grade producers made an unsuccessful appeal to the Office of Price Stabilization last week for either decontrol of crude prices or an increase of 72 cents a barrel on their product.

Their only hope for securing relief, they were told by OPS officials, lies in securing the support of the Petroleum Administration for Defense, but members of the producers' delegation came away from the meeting undecided whether that suggestion implied a promise that an increase would be granted on PAD's certification of its need or was merely a promise of further consideration of the matter.

In a 3-hour discussion of the problem, OPS officials agreed that the producers had made a presentation unassailable on the facts but said that under the regulations there was no way in which a better price could be provided on an area-wide basis, although admittedly needed.

No decontrol.—Decontrol was immediately ruled out, officials explaining that while no standards for suspension of price ceilings have yet been set there will be no decontrol of commodities selling at ceiling prices.

The producers explained that in the immediate postwar period the price of Penn Grade crude slumped from $5 to $4.25 per barrel, where it was frozen. Production costs have since risen by the 72 cents which

they sought of OPS, and as a consequence development is being slowed down throughout the area.

The OPS position basically was that under its rules and regulations relief can be afforded individuals to correct inequities within an area or alleviate other hardship, but no relief can be given an entire area or industry.

The only suggestion was that the producers present a case to PAD on which it would certify to OPS that Penn Grade oil is essential to defense and a definite shortage threatens unless an increase in price is given as an incentive to new development and increased production.

Officials gave the impression that if PAD made such a certification they then would act on the matter within 3 or 4 weeks.

Producers said that an increase in production in the Penn Grade area would be in line with PAD's expansion program, since there is an excess of some 25,000 bbl. daily in refinery capacity for the production of lubricants in the area.

Their appeal for assistance is expected to be laid before PAD this week.

Import Quota Filling

WASHINGTON.—More than 60 per cent of the oil to be imported this year under the reduced excise tax provided in the Venezuelan trade agreement entered the country in the first quarter.

Preliminary figures compiled by the Bureau of Customs shows that first-quarter imports aggregated 73,054,224 bbl. out of a 1952 quota of 118,520,200 bbl.

Receipts by areas of origin were: Venezuela, 33,334,138 bbl. out of a quota of 70,400,999 bbl.; Netherlands, 21,790,697 bbl. out of 22,163,277 bbl., and all other countries 17,929,389 bbl. out of a quota of 25,955,924 bbl.

CANADA

Gas Exports Approved

Alberta legislature stamps 41-4 o.k. on recommendations of conservation board; two obstacles to gas line remain

EDMONTON, Alta. — The Alberta legislature has given its approval to limited export of Alberta natural gas to British Columbia and the northwestern United States.

In doing so, it has adopted an Alberta Petroleum and Natural Gas Conservation Board report that a week earlier recommended export of gas from the Peace River district in northern Alberta.

With two hurdles negotiated, gas export from Alberta still must hurdle two more barriers. One is approval of the proposed route by Canada's federal Board of Transport Commissioners, which is not regarded as a severe obstacle.

The other obstacle, and considered a more difficult one, is the approval of the United States Federal Power Commission.

The Alberta legislature approved by a vote of 41 to 4 the issuance of a permit to Westcoast Transmission Co., Ltd., to export the Peace River gas over a pipe line route that would go through the interior of British Columbia to a point near the international boundary about 6 miles from Sumas, Wash., and thence south into the United States. A branch line would serve Vancouver, B. C.

Restrictions. — Premier Ernest Manning in announcing the government's policy favoring export from the Peace River district said stringent conditions are attached to approval of the permit for Westcoast Transmission. The agreement would be for 22 years. The premier estimated that it would take 2 years to build the pipe line.

He pointed out that conditions call for natural-gas service being provided to several small towns in the sparsely populated Peace River district.

He said the conservation board found there is a surplus of 300 billion cubic feet of gas in the Peace River area, but that it limits the total volume that can be exported in the first 5 years to 210 billion cubic feet. For the remainder of the agreement, the amount that can be exported will be fixed by the board.

He said that this amount to be fixed by the board can be less, or it can be greater, than the 42 billion cubic feet annually now allowed for export. This flexibility is provided so that if there are not enough reserves at the end of the 5-year period, the board may cut down the volume of gas for export. If there is an excess of reserves, the board can increase the export allowance.

Manning noted that the conservation board may require the gathering company to have extracted from the gas any product deemed desirable by the board. Purpose of this condition is to see that chemicals contained in the gas are not used to provide competition for Alberta's expanding chemical industry.

Tariff question. — He said that although it is a federal and not a provincial matter, his government has recommended to the federal government that if gas is exported to the United States without tariff duties, then products manufactured in Alberta from gas should enter the United States without tariff duties in free competition with products manufactured in the United States through the use of exported Alberta gas.

Manning admitted that limiting of export of gas to the Peace River area will slow export from the rest of the province, particularly the rich southern Alberta Pincher Creek gas field.

He held out hope that the discovery of further reserves would permit export of gas from Pincher Creek.

Products to Move This Fall

TORONTO.—A. N. Horne, president of Trans-Northern Pipe Line Co., said the company's new 10-in. products line from Montreal to Ontario markets will be in operation by October.

McColl-Frontenac Oil Co., Shell Oil Co. of Canada, and British American Oil Co., Ltd., each have a one-third interest in the line which will connect their Montreal East refineries with Cornwall, Prescott, Maitland, Kingston, Belleville, Port Hope, Toronto, Clarkson, and Hamilton in Ontario. A 6-in. line, 44 miles long, will serve Ottawa from a main-line connection near Cornwall.

Shipments of pipe are arriving at Montreal from Welland, and construction will proceed in three sections, Montreal to Morrisburg, Morrisburg to Belleville, and Belleville to Hamilton.

Initial pump stations will handle 40,000 bbl. a day, and additional pump stations will increase this to 60,000 bbl.

As many as 19 different products may be moved, including aviation and automotive gasolines, kerosine, light and medium fuel oils, stove oil, diesel fuel, mineral spirits, naphtha, rubber solvents, propane, and jet oils.

Gas Line Work to Begin

CALGARY. — Westcoast Transmission Co. plans to begin preliminary work immediately for its proposed natural-gas line from the Peace River area of Alberta to the Pacific Northwest.

The company's application for a permit to export natural gas was approved first by the Alberta Conservation board and last week by the Alberta legislature.

Frank McMahon, Westcoast president, said surveying will get under way immediately and actual construction of the line would begin upon approval of the line by the Canadian Board of Transport Commissioners in Ottawa and the Federal Power Commission in Washington.

Hearings are scheduled before the Board of Transport Commissioners June 2 and before the FPC June 16.

Costs Still Too High

Slight profit from plants producing fuel from coal would not justify private investment now, Ebasco survey shows

WASHINGTON.—Synthetic gasoline and liquefied petroleum gas can be produced from coal for sale at market prices indicating a slight return over costs, but the profit would be too slight to provide the 14 to 16 per cent return seen necessary to attract investment.

This was the finding of an engineering study made for the Bureau of Mines by Ebasco Services, Inc.

The Ebasco report, an evaluation of the bureau's cost estimates for the production of synthetic liquid fuels from coal, also disclosed that success of synthetic plants would depend upon the marketing of chemicals from which approximately 55 per cent of total revenues would have to be derived.

The projected financing of plants by the bureau on a basis of 40 per cent equity and 60 per cent debt was held by Ebasco to be impractical, and at least a 50 per cent equity was suggested.

Further, it was said, the return of 6.98 to 10.84 per cent provided, by bureau estimates in its report last October, is too low to permit private financing of synthetic projects. The indicated return on the equity investment would have to be from 14 to 16 per cent "in order to attract equity investment in a business of this type where the investor must wait from 3 to 4 years before his investment begins to earn any return."

Answer to N.P.C.—The Ebasco survey was made following the attack by a National Petroleum Council committee on the claim of the Bureau of Mines that synthetic gasoline could be produced profitably from coal to sell at less than 11 cents a gallon. The NPC committee placed the cost at from 41.4 to 43.5 cents per gallon. *(The Oil and Gas Journal, November 8, 1951, page 172.)*

The Bureau of Mines report was based on costs as of January 1, 1951, and the Ebasco survey was accordingly made on the same basis, although it was pointed out construction costs now would be at least 3 per cent higher. The whole study is based upon two hypothetical 30,000 - bbl. - daily plants—one at Rock Springs, Wyo., the other in Union County, Kentucky.

Investment estimates. — Ebasco reduced the bureau's estimates of capital investment from $414,440,000 to $403,827,000 for the Wyoming plant and from $404,120,000 to $395,987,000 in Kentucky by a number of modifications, among them elimination of any provision for the housing of workers, which the council committee said would be necessary.

Accepting the bureau's estimates of raw-material costs, which it was not instructed to review, Ebasco held that the operating forces required would be greater than those suggested by the bureau (as contended by the council committee). It placed the annual operating cost at $55,773,000 a year at Rock Springs, instead of $50,219,000 estimated by the bureau, and $54,723,000 in Kentucky, instead of $49,438,000.

Ebasco also reduced the bureau's estimates of annual product revenue in the case of the Rock Springs plant from $79,859,100 to $76,180,700 and from the Kentucky plant from $90,885,000 to $86,658,100.

Production. — The engineers' report estimated that the Rock Springs plant could attain an annual product output by 1955 of 6,816,000 bbl. of gasoline and 108,800,000 gal. of L.P.G., and the Kentucky plant could produce 6,076,000 bbl. of gasoline and 126,800,000 gal. of L.P.G. The gasoline estimates were somewhat larger than those of the bureau due to a lower cresol production seen by Ebasco.

On the basis of January 1, 1951, prices of 11 cents a gallon for gasoline and 4 to 5 cents a gallon for L.P.G. Ebasco estimated that the Rock Springs plant would get $31,488,600 for its gasoline and $4,350,000 for L.P.G. The Kentucky plant would sell $28,073,100 worth of gasoline and $6,340,000 of L.P.G.

Chemical revenue.—Well over 55 per cent of the plants' revenue would have to come from the benzene, toluene-xylene, phenol, m-p-cresol, o-cresol, xylenol, ammonium sulfate, and sulfur which they also would produce. In effect this would make the plants chemical installations with petroleum-type byproducts rather than synthetic-liquid-fuel plants with chemical byproducts.

With the modifications made by Ebasco, the return on equity investment from the Rock Springs plant would be 4.26 per cent on a basis of 60 per cent debt and 40 per cent equity and 3.59 per cent on a 50-50 basis. That from the Kentucky plant would be 7.56 per cent on a 60-40 basis and 6.22 per cent on a 50-50 basis. The bureau had estimated a 6.98 per cent return from Rock Springs and 10.84 per cent from Kentucky on a 60-40 basis.

To attract capital with the conditions under which the plants would be built, Ebasco held a return on equity of 14 to 16 per cent would be essential. Since this could be secured only by higher prices for products, it was estimated in nongovernmental circles that the price for gasoline would have to be from 15.7 to 17.6 cents per gallon.

Eight - plant industry.—Ebasco also estimated the possible business that could be done by 1960 by an eight-plant industry with a 240,000 bbl. per day operation. It qualified its assumptions, however, by pointing out that while it is possible the entire indicated output would be marketable, the market analysis indicates that a somewhat more conservative estimate should be made regarding some of the products. Specifically, it said, there is a probability that somewhat smaller quantities of toluene-xylene, phenol, and m-p-cresol could be marketed than estimated by the bureau.

The eight-plant industry could produce 54,325,000 bbl. of gasoline giving a revenue, at 11 cents per gallon, of $250,982,380; 217,600,000 gal. of L.P.G. to provide $8,704,000 at 4 cents a gallon; and 760,800,000 gal. of other L.P.G. to provide $38,040,000 at 5 cents a gallon. These products would develop $297,726,380 of the estimated sales revenue of $551,573,580.

Factors held favorable.—Despite the many influences to which it would be subjected, many of them adverse, Ebasco reached the conclusion that on the whole the factors were favorable.

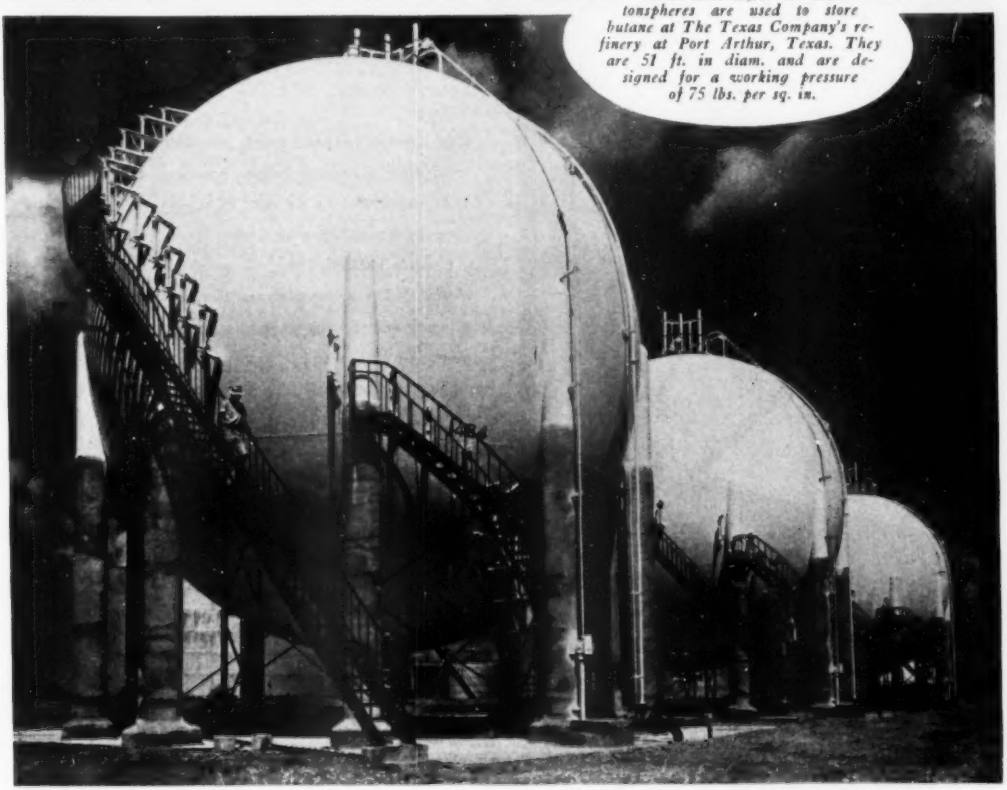
"As a prerequisite to the evaluation of the financing program as proposed in the Bureau of Mines report, we have reviewed and considered the elements of business risk involved in the financing of a coal-hydrogenation project in an assumed going industry.

"The major factors are: the rapidly increasing demand for liquid fuels and basic chemicals; the assured supply of raw material for the process; the controlled high quality of the products produced; and the flexibility of the process, enabling the variation in output to meet changes in demands. In our opinion, all of these factors tend to give the coal-hydrogenation project the character of stability."

However, the report concluded, "we do not believe it would be feasible to finance the projects described in the Bureau of Mines report dated October 25, 1951 with private capital under conditions prevailing January 1, 1951."

In its analysis of the bureau's report last year, the NPC committee,

SIX REASONS WHY HORTONSPHERES PROVE SUPERIOR FOR STORING BUTANE



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4. **Minimum Corrosion** — Since oxygen is rarely present in a Hortonsphere—corrosion on the inside of the tank shell is materially reduced. A longer, more profitable life is assured.

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Chicago, 4.....2128 McCormick Bldg.
Cleveland, 15.....2204 Guildhall Bldg.
Detroit, 26.....1514 Lafayette Bldg.
Havana.....402 Abreu Bldg.
Houston, 2.....2119 C & I Life Bldg.
Los Angeles, 17.....1523 General Petroleum Bldg.
New York, 6.....3347—165 Broadway Bldg.
Philadelphia, 3.....1615—1700 Walnut Street Bldg.
San Francisco, 4.....1544—200 Bush St.
Seattle, 1.....1325 Henry Bldg.
Tulsa, 3.....1606 Hunt Bldg.
Washington 6, D. C.....1139 Cafritz Bldg.

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headed by W. S. S. Rodgers of The Texas Co., charged that the estimate of the cost of the Rock Springs plant was low by $47,500,000, that the bureau had underestimated working capital, startup expense, and other capital charges by $19,000,000, and that it would be necessary to spend $55,000,000 more than the bureau figured for housing.

Capital prices questioned.—The committee also questioned the bureau's estimates of product prices as "optimistic" and, particularly in the case of L.P.G., possibly beyond attainment. Ebasco kept out of this field, taking the January 1, 1951, prices as the basis for its estimates of revenue.

The Ebasco report agreed with the NPC group that a 60-40 capital setup was unrealistic. The committee pointed out that the borrowed capital in the oil industry is in the neighborhood of 20 per cent or less and asserted that "an unproved operation such as a synthetic-fuels plant could not expect a large proportion of borrowed funds without the guarantee of a financially responsible third party."

Reviewing the marketability of the various chemical products available from hydrogenation, Ebasco stated that with the exception of m-p-cresol they could be effectively marketed by 1955 at prevailing prices. However, it emphasized, its conclusions with respect to the amounts marketable refers to the output of either plant alone and not to a combined output of both plants.

Synthetics Pushed

Commercial production is needed now, Chapman says

WASHINGTON.—The nation cannot afford further to delay commercial production of synthetic liquid fuels, Interior Secretary Oscar L. Chapman warned this month in his annual report.

Emphasizing that "the time is now at hand when we must begin to move into commercial production of these synthetic fuels," Chapman pointed out that "it is not possible to increase oil-refining capacity overnight, and by the same token it takes time to build synthetic-liquid-fuel plants."

It is now highly desirable that commercial synthetic-fuels plants be started to bridge the gap between industry and the research and demonstration work already done by the Bureau of Mines, he said.

Data available.—"Enough technical and engineering data are now available to provide a sound basis for proceeding with commercial development of synthetic-fuel plants," Chapman reported. "Enough of the raw materials—coal and oil shale—exist to meet all oil requirements for many years. Besides providing a dependable source of gasoline and diesel fuel, these resources could yield much needed supplies of benzene and other critical aromatic chemicals used in manufacturing explosives, synthetic rubber, and other important defense materials."

In his report, the secretary strongly protested any sidetracking of the long-range programs of the department for the more immediate needs of the defense program. The obligation to enrich the nation by proper development and use of natural resources is fully as important as mobilization, he asserted, and "we could make no greater mistake than to assume that we could meet the immediate challenge at the cost of our long-run development."

Economic danger.—If development of basic resources is ignored in order to meet the immediate pressure of military demands, Chapman warned, "we run a grave danger of saddling ourselves with a straight military economy."

"We do not need to worry about our fuel supply in this country, if we continue vigorously to develop our resources in the midst of this emergency," he said. "If we fail to do so we shall eventually find ourselves severely pinched as mounting demands press harder and harder upon presently available resources. The reserves are there, but they cannot be brought into production overnight."

NPC Expected to Disagree

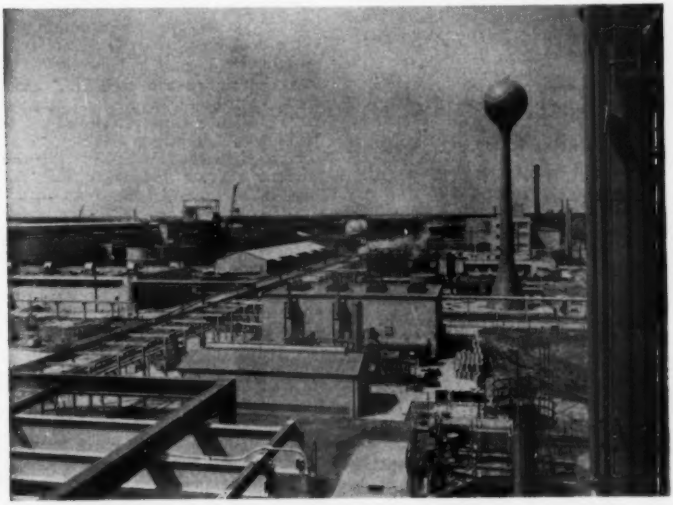
WASHINGTON.—The controversy over the cost of producing synthetic liquid fuels on a commercial basis is expected to be revived this week when the National Petroleum Council convenes for its quarterly meeting.

The Interior Department has released the latest estimate of costs, prepared for it by Ebasco Services, Inc., and while the council's own committee is not planning to submit any rebuttal at this time, it is expected that individual members will have much to say about the figures.

The department has asked NPC to make another study of storage capacity and tankage and may file another request before the meeting. Only one final report, from the committee on underground storage headed by H. M. S. Burns of Shell Oil Co., is scheduled to be filed, but Russell B. Brown of the Independent Petroleum Association of America will submit a progress report for his committee studying industry needs for oil and gas-country tubular goods.

The committee on personnel is expected to recommend a suitable memorial to the late Harold L. Ickes, former Secretary of the Interior and wartime petroleum administrator, probably in the form of a resolution, and an expression of appreciation to the industry men serving on the Petroleum Administration for Defense who have completed their assignments.

The council has scheduled a testimonial dinner for Walter S. Hallanan, who has served as chairman of the council since its organization.



More Tetraethyl Lead Available

A major factor in PAD'S recent action in decontrolling the use of tetraethyl lead for blending gasoline was the completion of this $45,000,000 TEL plant of Ethyl Corp. near Houston. The plant has just been placed in operation and will increase by about one-third the nation's capacity to produce this antiknock ingredient.

Equipment Rundown

Suppliers can furnish enough rock bits, tool joints, and wire rope; stocks of other items are low or nonexistent

WASHINGTON.—Sore spots in the equipment-supply situation have been pinpointed by the Petroleum Administration for Defense on the basis of information developed last month in a conference of PAD officials, representatives of the petroleum-equipment supply industry, distributors of oil-country tubular goods, and Government officials.

Only in the cases of rock bits and tool joints and wire rope were supplies felt to be adequate both for current needs and probable near-future demand.

As one means of improving the tubular-goods situation, the supply-store men present at the conference suggested that the M-6A set-aside field stocks be made available to all operators who normally drill 20 or fewer wells in a year.

Purchase of these stocks now is limited to operators who drill not more than eight wells a year, and it was pointed out that the smaller operators do not buy any great amount of large-diameter pipe. As a result, large-diameter pipe is accumulating in inventory and is keeping supply stores from placing maximum new mill orders.

Conclusions and recommendations reached in the conference have been summarized by PAD as follows:

. . . **Valves and fittings:** Over-all, no particular problem. Inventories of steel-welded fittings are somewhat low, however, and steel valves, particularly in the larger sizes for high-pressure use, are in short supply.

. . . **Anti-friction bearings:** Inventories are somewhat lower than normal but do not now present a pressing problem. If the industry is to realize expanded program goals, however, according to supply-store representatives, production of bearings for the oil and gas industry must be increased.

. . . **Roller chain:** Inventories for drilling rigs were reported very low and in some cases nonexistent. NPA explained that steps already have been taken to increase allotments of steel for chain, and improvement should be noted quickly. Industry representatives urged that both NPA and PAD watch the situation closely.

. . . **Drilling rigs:** Small rigs were reported practically unavailable at the moment, and supply stores are placing their orders 9 months in advance. The chief bottleneck in delivery of rigs, it was said, is the acute shortage of portable masts and derricks.

. . . **Unit pumpers:** Larger sizes reported to be in particularly short supply, but inventories of small pumpers for shallow wells normal.

. . . **Sucker rods:** Carbon-steel sucker rods in adequate supply, but nickel-bearing rods very tight. Government officials said no immediate relief is in sight because of high direct-defense demands for nickel. The situation may become worse before it begins to improve.

. . . **Rock bits and tool joints:** Both in adequate supply.

. . . **Noncaptive engines** (not made as a component part of a particular drilling rig, pumper unit, etc.): Industry men reported an acute shortage in the 100 to 300-hp. class. Smaller engines in adequate supply.

. . . **Drill pipe:** In such short supply that many drilling contractors are using pipe worn beyond the safety point. Government representatives pointed out that production has increased sharply since 1949, and, if present rates of output are maintained, the 1952 supply will be approximately 104,000 tons—double the 1950 production. Industry representatives urged that every effort be made to increase the amount of drill pipe available.

. . . **Wire rope:** In plentiful supply in sizes used by the oil industry, and industry experts recommended that distribution be taken from under government controls.

Tax Aid Granted

Reef Fields' $6,202,445 gasoline plant approved

WASHINGTON.—The Defense Production Administration granted a certificate for accelerated amortization of a $6,202,445 project of Reef Fields Gasoline Corp. for natural-gasoline production in Borden and Howard counties, Texas. The certificate provides for quick write-off of 65 per cent of $4,900,485 and 40 per cent of $1,246,960.

Other large projects approved by DPA last week included a $4,868,200 investment by Sun Oil Co. for production of acid oils at Marcus Hook, Pa., granted 65 per cent of $3,257,925 and 40 per cent of $661,500; a $2,300,000 natural-gas project of Southeastern Michigan Gas Co. at Port Huron, Mich., 25 per cent of $2,298,650; a $1,646,000 project of Monsanto Chemical Co. for oil additives at Monsanto, Ill., 65 per cent of $760,050, 40 per cent of $798,050 and 15 per cent of $87,900; and a $581,200 project for lubricating-oil additives by Oronite Chemical Co. at Oak Point, La., 50 per cent of $316,630, 30 per cent of $153,770, and 10 per cent of $83,800.

Pipe line.—Three pipe-line projects also were approved. Two were oil pipe lines for Susquehanna Pipe Line Co., Fostoria, Ohio, $3,070,000, and for Phillips Petroleum Co., Bartlesville, Okla., $1,497,960 of which $1,184,950 was approved, both for 25 per cent. The other was a gas line for Pacific Gas & Electric Co., Muroc, Calif., $151,445, 50 per cent.

Ethyl Corp. was given clearance for a $4,155,300 plant at Baton Rouge, La., to produce antiknock compounds, 65 per cent of $1,563,700 and 50 per cent of $2,591,600.

Storage projects on which amortization was allowed on 40 per cent of the investment were approved for Shell Oil Co. at Wagner's Point, Md., $330,000; United Oil Manufacturing Co. at Erie, Pa., $152,394 ($110,000 certified); Gulf Oil Corp. at Charleston, S. C., $113,404; Sinclair Refining Co. at Minneapolis, $525,000; and Phillips Petroleum Co. at Burley, Idaho, $493,600 ($421,075 certified).

A certificate also was granted Las Vegas Gas Co., for storage and distribution of gas, $58,728, on which 70 per cent was allowed on $48,698 and 50 per cent on $10,030.

Structural Steel Allocated

WASHINGTON.—The National Production Authority paved the way last week for extensive summer construction in the oil and gas industry.

Allocating carbon structural steel for the third quarter, NPA announced the Petroleum Administration for Defense would be given 80,000 tons, as compared with 51,480 tons for the current quarter and 55,000 tons for the first 3 months of this year.

The increased allocations of structural steel were made possible, NPA said, "because we have passed the peak of the excessive demand for critical materials of the industrial expansion program during the second quarter."

Box Score on Expansion

WASHINGTON.—A total of 3,573 applications for priorities assistance for expansion projects in the oil and gas industry to cost an estimated $3,516,961,284 have been approved by the Petroleum Administration for Defense.

Another 282 applications totaling $1,121,689,139 currently are under review.

The applications granted, which do not include priorities for the purchase of materials for the drilling of

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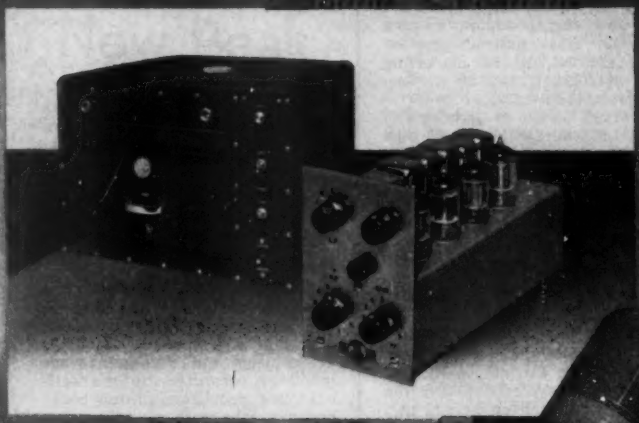

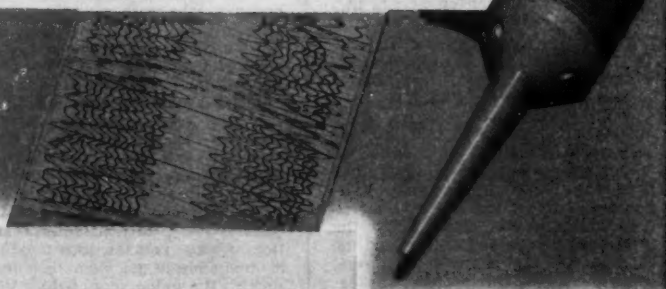

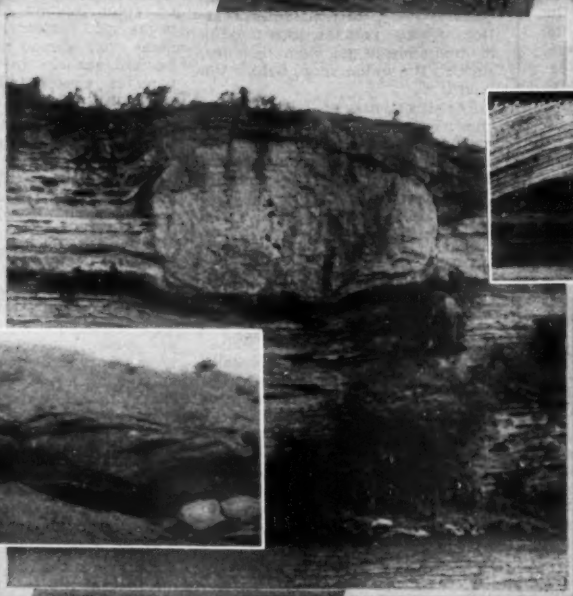

Result in...

the discovery of geological formations favorable for the accumulation of oil.

Seismograph Service Corporation

oil and gas wells, included 1,747 natural-gas projects valued at $1,349,614,966; 665 refining projects amounting to $1,124,677,502; 668 projects for supply and transportation costing $727,363,692; 314 natural-gasoline projects, $265,095,204; 99 marketing projects $11,813,651, and 80 production projects, $38,396,239.

Applications on 289 projects valued at $124,401,841 were either withdrawn after filing or denied by PAD after review.

Civilian Diesel

War should not require sharp cutback in quality

WASHINGTON.—Military requirements for petroleum products in the event of war will not be such as to require any sharp reduction in the quality of diesel fuel for civilian use.

This is the report given the Petroleum Administration for Defense by its military-fuels technical-advisory committee, one of two military groups set up last February.

Early estimates of wartime needs by PAD had indicated that military requirements would be such as to indicate deterioration of diesel fuel. The Association of American Railroads and the Coordinating Research Council, jointly sponsored by the American Petroleum Institute and the Society of Automotive Engineers, were advised to that effect. The assumption at that time was that there would have to be major diversions of blending stocks from diesel to jet fuels.

On the basis of present estimates of wartime military needs, however, the PAD committee decided they would not make serious inroads on blending stocks for diesel fuel.

New test methods.—At its first meeting, the military-fuels committee advised PAD to attempt to have new test methods developed for measuring the pumpability and compatability of Navy special fuel oil and recommended procedures for conducting a survey to determine how essential lithium-base greases are in comparison with other types.

Pointing out that there is evidence that present tests are not completely indicative of the actual performance of Navy special in naval vessels, the committee recommended that PAD ask the American Society for Testing Materials to cooperate with the Navy Boiler Turbine Laboratory in developing new test methods.

With respect to lithium-base greases, the committee recommended that PAD ask the manufacturers, the National Lubricating Grease Institute, and the American Society of Lubricating Engineers to make available the results of their experimental or field-operating test work.

WATCHING WASHINGTON

Bertram F. Linz

Industry Says "No Dice"

Refusal of oil companies to engage in wage hearings under the arbitrary rules laid down by the Wage Stabilization Board is seen by Washington observers as indicative of a widespread rebellion of industry against what appears to be the "heads I win; tails you lose" policy of the administration in favor of labor.

The decision in the steel case, these observers say, demonstrates that industries coming to Washington must expect the unions to get at least the maximum wage increases permitted by the self-enforcing provisions of the board and probably more, plus the union shop.

That decision has set a movement afoot in Congress to revamp the Defense Production Act to give industry something approaching a fair deal. An amendment sponsored by Senators Dirksen of Illinois, Bricker of Ohio, and Schoeppel of Kansas would wipe out the present tripartite board and set up an all-public board. The bill would confine the board to interpretation of wage policies, thus making it impossible to get labor disputes, such as the union shop, before the board.

The insistence of labor on inclusion of the union shop in board recommendations is attributed to a realization that the unions need a weapon to force workers to join. In the last decade, it is said, 9,000,000 persons have joined the labor force, but organized union membership has grown by only 300,000.

With the present setup of the wage board, the public members hold the balance of power. When cases come up for decision, industry and labor members normally are far apart and it is left to the public group to reach a compromise acceptable to one side or the other. Since industry won't go up and labor will come down—slightly—it is a foregone conclusion that the board's eventual recommendations will be more favorable to the unions than to the employers.

Looking at the Record

Congress has reached the halfway point of the 1952 session with a considerably better record for both speed and economy than has been made in several years.

The House has passed all of the appropriation bills for the coming fiscal year with the exception of those for foreign aid and supplemental financing and in the process has cut the President's spending program by nearly $6,500,000,000. If the Senate goes along with these cuts, President Truman's forecasts of a heavy deficit in 1953 won't pan out.

A tabulation of other work done by Congress shows that since January 1, 1951, it has instituted some 225 investigations beyond those required in connection with appropriations and 60 of them are being carried out now. Many of these inquiries have had to do with graft and corruption in the Government, and few, beyond the investigations of various phases of the mobilization program, have directly affected industry or business.

Two or three of these investigations have had to do with the impact of the defense program on interests in the oil and gas industry and the manner in which they are being protected by the Petroleum Administration for Defense. However, there has been no great interest displayed in a probe of industry activities at home or abroad such as has marked sessions in the past, and none is expected to be undertaken this year.

Oil's Steel Cushion

The temporary drop in steel production when a strike appeared inevitable will have practically no effect upon operations in the oil and gas industry.

The cushion provided by the Petroleum Administration for Defense under its policy of holding back a small part of the steel supply when making initial allocations as a guard against a possible emergency is expected to be sufficient to make up the loss which is expected to be not more than 2 per cent of the year's output.

PAD officials are confident that all normal activities of the industry will be unaffected and the expansion program at most will be only slightly slowed down.

Meanwhile figures on shipments compiled in the steel industry indicate that oil and gas producers fared pretty well last year. They got 834,632 tons of steel, or 1.1 per cent of mill shipments to consumers, against 620,444 tons, or 0.9 per cent, in 1950. This does not include steel secured by the industry from warehouses.

Production at New Peak

World crude output estimated at 12,077,000 bbl. daily in February; United States accounts for two-thirds of gain

Dahl M. Duff

WORLD production of crude oil surged to an all-time high in February with a daily average of 12,077,000 bbl.

This figure represented a gain of 5.8 per cent or about 664,000 bbl. over global production in February 1951 and was 1.5 per cent or about 176,000 bbl. daily above that in January.

United States production, which increased to an estimated 6,359,000 bbl. daily accounted for about two-thirds of the expanded output. Domestic production stood at 429,000 bbl. daily over February 1951 and 142,500 bbl. daily over January of this year.

Foreign production still shows the effects of the loss of Iranian crude. The February output for non-Communist foreign areas was 4,686,700 bbl. daily. Though slightly above February 1951, this figure was still about 192,000 bbl. daily below the record non-Communist foreign production reached last May.

As compared to January, foreign production presented a spotty picture. Several important countries reported declines, others showed increases which for the most part were small. The net foreign change was an increase of 33,200 bbl. daily.

Iraq gains sharply.—The most outstanding foreign-production development was the sharp increase reported in output in Iraq. The average daily rate in this Middle Eastern country was up nearly 39,000 bbl., about 21 per cent, to a new record of 225,800 bbl. The gain was attributed to the running of additional crude to fill Iraq Petroleum Co.'s new 30 and 32-in. line from Kirkuk field to Banias, Syria.

The February increase in Iraq foreshadowed much larger ones to come later. In February, filling of the line was only begun. The first tanker, a French vessel, was loaded at Banias April 9, and as pump-station construction continues, throughput of the line will increase to about 300,000 bbl. daily by the end of the year. Total Iraq production is expected to be about 500,000 bbl. daily early next year.

Elsewhere in the Middle East, January-to-February changes were less significant. A 30,000-bbl.-daily decline in Kuwait's production was partially offset by gains in Qatar and Saudi Arabia.

Saudi Arabian production rose to 864,900 bbl. daily, up about 11,000 bbl. daily over January but still below the record 896,700-bbl. mark chalked up last November.

Qatar's production of nearly 64,000 bbl. daily in February was a record for this shaikdom, and further modest increases are slated.

WORLD CRUDE-OIL PRODUCTION
(In thousands of barrels daily)

Country—	Feb. 1952	Jan. 1952	Feb. 1951
Western Hemisphere:			
Argentina	68.0	68.0	66.7
Bolivia	1.5	1.5	1.5
Brazil	1.6	1.4	2.2
Canada	100.8	124.4	98.3
Chile	2.2	2.2	1.9
Colombia	103.8	107.4	108.4
Cuba	0.1	0.1	0.4
Ecuador	7.7	7.7	7.0
Mexico	221.0	206.0	209.9
Peru	45.5	45.5	42.4
Trinidad	57.0	56.4	56.3
Venezuela	1,828.4	1,811.7	1,635.9
Total	2,437.6	2,432.3	2,230.9
Europe and Africa:			
France	6.5	6.9	4.5
French Morocco	2.0	1.9	1.1
Germany	30.7	29.1	24.0
Italy	0.6	0.5	0.1
Netherlands	13.8	13.8	14.0
Egypt	45.0	45.5	45.5
United Kingdom	1.1	1.0	0.9
Total	99.7	98.7	90.1
Middle East:			
Bahrein	31.0	30.1	30.6
Iran	30.0	30.0	704.6
Iraq	225.8	187.0	170.5
Kuwait	643.8	674.1	358.8
Qatar	63.8	57.5	48.8
Saudi Arabia	864.9	853.7	633.7
Turkey	0.4	0.4	0.3
Total	1,859.7	1,832.8	1,947.3

Country—	Feb. 1952	Jan. 1952	Feb. 1951
Other Asia:			
British Borneo	105.0	104.8	102.4
Burma	2.2	2.2	2.0
China	2.2	2.2	2.2
India	5.0	5.0	5.0
Indonesia	162.0	162.0	155.0
Japan	5.5	5.7	6.1
New Guinea	4.8	4.8	4.9
Pakistan	3.0	3.0	3.7
Total	289.7	289.7	281.3
Total foreign less Russia and E. Europe	4,686.7	4,653.5	4,549.6
Estimated Russia and Eastern Europe:			
Austria	43.0	43.0	34.0
Romania	95.0	95.0	85.0
Russia	860.0	860.0	790.0
Other E. Europe	33.2	33.2	24.1
Total	1,031.2	1,031.2	933.1
Total foreign	5,717.9	5,684.7	5,482.7
United States	6,359.0	6,216.5	5,930.0
World total	12,076.9	11,901.2	11,412.7

Figures are from reliable reports in the industry or official government sources. Data for Russia and Eastern Europe are based on competent estimates; no authentic information is available on month-to-month production in these areas. Completely current reports also are lacking for certain countries of Southeast Asia. Data for earlier months have been revised where necessary.

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TREND OVER THE LAST YEAR

	Western Hemisphere less U. S.	Middle East	Total foreign less Russia & E. Europe
March	2,254.1	1,961.1	4,581.1
April	2,261.5	2,013.4	4,632.1
May	2,314.0	2,203.8	4,878.4
June	2,335.5	2,172.4	4,877.8
July	2,374.5	1,835.5	4,579.0
August	2,388.0	1,789.7	4,555.3
September	2,396.3	1,741.7	4,517.6
October	2,395.6	1,810.6	4,585.6
November	2,383.7	1,940.4	4,709.5
December	2,404.9	1,846.3	4,633.1
January	2,432.3	1,832.8	4,653.5
February	2,437.6	1,859.7	4,686.7

New Venezuelan record.—Venezuelan production showed another small increase of about 17,000 bbl. daily to reach a new high. It was the sixth consecutive record. In only 1 month out of the last 14 has Venezuelan production failed to rise. There are some expectations that Venezuelan production will reach 2,000,000 bbl. daily by the end of the year, but this prediction may be somewhat optimistic in view of the relatively small month-to-month gains.

Production by weeks in Venezuela was as follows: Week ended February 4, 1,818,000 bbl. daily; February 11, 1,818,200 bbl. daily; February 18, 1,830,400 bbl. daily; and February 25, 1,832,600 bbl. daily.

VENEZUELAN PRODUCTION

(Government figures for February in barrels daily.)

Creole	820,796
Shell	564,339
Mene Grande	289,978
Socony-Vacuum	56,680
Texas	19,362
Mercedes	25,243
Atlantic	17,459
Richmond	19,820
Sinclair	14,108
Pantepec	8,696
Phillips	10,592
B.C.O.	988

Decline in Canada.—Crude production in Canada dropped back nearly 24,000 bbl. daily in February to a winter's low of about 101,000 bbl. daily. Stepped-up production in Canada is not expected until shipping begins to move crude in quantity from the Superior, Wis., pipe-line terminal.

Mexican crude production in February was shown in preliminary figures to have increased to slightly over 220,000 bbl. daily.

Production in Colombia declined about 4,000 bbl. daily in February, largely as a result of decreased production in Shell's Yondo concession and the closing in of small Cantagallo field, also Shell owned. February production by concessions was: De Mares, 35,335 bbl. daily; Barco 27,334 bbl. daily; Yondo, 37,231 bbl. daily; Dificil, 1,554 bbl. daily; and Velasquez, 2,410 bbl. daily. Condensate production from De Mares was 2,376 bbl. daily, making an over-all total of 106,240 bbl. daily.

In West Germany, the February production of 125,802 metric tons was equivalent to 30,700 bbl. daily. The daily average was a new high for the republic. Output by areas was: Emsland, 53,391 tons; other Lower Saxony, 62,550 tons; Hamburg and Schleswig-Holstein, 9,389 tons; and Baden, 472 tons.

EUROPE

Hurry-Up Job

Refinery on Isle of Grain to begin operations soon

LARGEST refinery project currently under construction outside the United States is the completely new Kent, England, plant of Anglo-Iranian Oil Co., Ltd., which will go into initial operation this spring.

The refinery, located on the so-called Isle of Grain near the confluence of the Medway and Thames estuaries about 40 miles south and east of London, was first planned for 40,000 bbl. daily capacity. Last year—after the shutdown at Abadan—the construction program was accelerated and the capacity approximately doubled.

The refinery is completely new from the ground up. Only previously existing facilities consisted of a storage terminal of Medway Oil & Storage Co., Ltd., which is being absorbed into the over-all project. On the south side of the 600 acres now being developed, the Medway River provides tanker-berthing frontage with a 40-ft. water depth.

Work was started on the refinery in June 1950, and the first operation this spring with an initial capacity of 42,000 bbl. daily will make it one of the fastest major plant-construction jobs on record. By the end of the year, the refinery is expected to be running at its full throughput of about 84,000 bbl. daily.

Process facilities include the single large distillation unit which had been erected and tested by late February, two 17,000-bbl. daily vacuum units, a 10,000-bbl. daily catalytic cracker, gasoline stabilizer, rerun facilities, copper chloride treaters, acid treater, tannin solutizer, and a lubricating-oil section with propane deasphalting, furfural extraction, M.E.K. dewaxing, and a clay contact plant.

Other plants for product-quality improvement and special products which are scheduled to follow, consist of a catalytic reformer, catalytic polymerization unit, and an SO_2 treatment plant. Fresh water will be taken from wells drilled to about 800 ft. The generator plant consists of four alternators with a total capacity of 16,000 kva.

The layout of the plant was influenced by the marshy character of the ground. The alluvial mud overlying the gravel and clay varies in depth from a few feet up to 90 ft. at the site of the jetties. The heaviest equipment was located where piling was not required.

Elsewhere, a total of about 2,000 concrete piles from 15 to 70 ft. long are being used to support equipment. All roads and rail tracks in the vicinity have been raised about 3 ft. above the marsh level, while surface pipe tracks are carried about 9 in. above the ground level on pile supports.

Yugoslav Find Reported

An oil discovery at a depth of 600 m. (1,970 ft.) is reported to have been made by the Yugoslav government oil organization at Buljarice near Petrovac in Montenegro.

The Yugoslav deputy minister for industry and public works was quoted by the Yugoslav news agency as saying it is too early to say whether the production will be commercial. The discovery was made after more than a year of exploration.

Yugoslavia is preparing to spend some 30 per cent more this year on field and refinery equipment. Purchases for the country's oil operations will be made mainly in the United States, Germany, and Italy.

Italian Gas Find Announced

A natural-gas discovery at Correggio, Emilia, in Italy, has been announced by Azienda Generale Italiana Petroli, the Italian Government oil organization.

The well is producing 200,000 cu. m. (about 7,000,000 cu. ft.) daily from between 1,100 and 1,200 m. (3,610 to 3,940 ft). AGIP said the discovery was of considerable importance and that it was the first major production outside the five main Po Valley gas structures around Piacenza.

Imports Action Criticized

Action of the West German Government in liberalizing petroleum imports effective April 1 has been protested by the country's oil industry which has declared the result may be a shutdown of refineries.

Industry representatives told the

economics ministry that present stocks amount to more than 430,000 tons covering about 4 months' domestic requirements. They pointed out that the enlargement of refinery capacity over the last few years was encouraged by the government and the Organization for European Economic Cooperation in a planned program to reduce West German products imports.

West Germany's refinery capacity is now about 6,100,000 tons for crude oil, and 460,000 tons for topped crude and rerefining. Imports of crude rose from 1,224,000 tons in 1950 to 3,451,000 tons last year. The share of products in total oil imports dropped from 20.9 per cent in 1950 to 11.6 per cent last year.

LATIN AMERICA

Income Wanted

Guatemala eyes passage of more liberal oil law

GUATEMALA'S new minister of economy, Roberto Fanjul, has assured oil companies interested in the country that he will "make a detailed study of Guatemala's laws governing the exploration for petroleum and the exploitation of oil deposits."

The object of this action, he said, will be to recommend to congress changes in the country's oil laws, which would make a full investigation of Guatemala's oil deposits more attractive to foreign interests.

Major United States oil firms withdrew from the country after spending considerable sums in exploration surveys when a stiff, highly nationalistic set of laws controlling exploration and exploitation in Guatemala was passed in 1949.

Results of these surveys were sufficiently encouraging for the firms to apply to the government for development rights. It was then that the "possible intrusion of foreign interests" in Guatemalan affairs became a national issue, and the law was passed which oil firms claimed made operations impossible.

Since then all exploration has ceased except for minor survey work carried out with a limited budget by the country's National Petroleum Institute.

Prospects. — Guatemala's known oil deposits underly the northeastern part of the country, known as the Peten, which is bordered by Mexico and British Honduras. Extent of the deposits are not known.

Mexico now has producing wells near the Guatemalan border, and Gulf Oil Corp. is currently exploring oil deposits in British Honduras, also near the border.

It is thought that many government officials will look favorably upon any new and more liberal oil law in view of the currently deteriorating economic situation in the country. These officials feel that an infusion of "oil money" will help counteract financial difficulties resulting from the slowly dropping world price for green coffee, on which the republic's economy primarily is based.

Peru Studying New Oil Rules

Regulations which will implement provisions of the new Peruvian Petroleum law are being studied by the government and may be promulgated early in June.

The law *(The Oil and Gas Journal, March 3, page 63)* follows the 50-50 profits participation formula though with some additional features that have made the industry somewhat reserved in its acceptance of the measure.

The regulations will spell out terms of the law and will go far in determining whether and how extensively new companies will enter Peru under the legislation. Industry representatives are hoping for regulations as liberal as possible which will clarify some of the tax provisions, limitations on concession acreage, and other features.

Several major operators are showing considerable interest in the law. Copies may be obtained at $15 each regular mail and $17 airmail from Enrique Normand, Apartado 932, Lima. Normand is secretary of the Peruvian Sociedad Mineria.

Creole Output Climbs

Production of Creole Petroleum Corp. in Venezuela during February averaged 811,189 bbl. daily, an increase of 5,144 bbl. daily over the previous month.

The month's net production, plus purchased royalty oil, was 77,371 bbl. daily greater than the output of February 1951. Of the February 1952 total, 634,929 bbl. daily came from the Lake Maracaibo region, 15,215 bbl. daily from Cumarebo and Mara, and 161,045 bbl. daily from Eastern Venezuela. The month's operated production was 759,991 bbl. daily.

Throughput of Creole's two Venezuelean refineries also showed an increase in February. Runs at Caripito averaged 66,815 bbl. daily against 63,095 bbl. daily in January, and at Amuay, 75,420 bbl. daily against 73,387 bbl. daily.

During February Creole operated an average of 15.8 rigs and made 10 completions. Two were exploratory wells, one dry in Tonoro at 11,030 ft., and the other a successful oil well in Maracaibo, producing 264 bbl. daily and drilled to 7,739 ft. total depth. The month's average of operating rigs compares with 18.7 in January and 9.7 in February 1951.

Venezuelan Activity Up

Activity in the Venezuelan petroleum industry has shown further sharp increases in recent months.

Rigs operating in Venezuela have climbed to 121. Recent figures show the following rigs by operating company: Creole 19, Shell, 30, Mene Grande 36, Atlantic 3, Texas 6, Mercedes 6, Phillips 6, Sinclair 6, Richmond 3, and Socony-Vacuum 6.

This is an increase of 28 rigs over the total operating in January 1951. Behind this stepped-up drilling activity is the necessity of maintaining and making further steady increases in the country's record production, which in February averaged 1,828,421 bbl. daily.

Exploration activity also is up substantially over a year ago. Geological and geophysical parties in the field totaled 45 in January. Geological field parties numbered 20 as compared with 16 a year earlier, and seismograph parties totaled 19 against 14 in January 1951. Three gravity-meter parties were working in Venezuela compared to one a year earlier. The number of structure drill parties was unchanged at three.

Big Crude Line Operating

The new 160-mile, 30-in. crude line built by Shell Caribbean Petroleum Corp. from Palmarejo, on the west side of Lake Maracaibo, to the Paraguana Peninsula has gone into limited operation.

First crude arrived in storage at Shell Punta Cardon refinery the morning of March 5, and the initial pumping rate was about 135,000 bbl. daily. As soon as the station at Palmarejo is finished, capacity will be raised to 235,000 bbl. daily, and 290,000 daily throughput will be possible with the addition of one pumping unit at Palmarejo, the only station.

The line is operated by Shell but is owned jointly by Shell, with 88.89 per cent interest; Texas Petroleum Co., 6.66 per cent; and Mene Grande Oil Co., 4.45 per cent. Deliveries will be made to the Las Piedras shipping terminal as well as to Cardon, where capacity of the Shell refinery is being increased to 170,000 bbl. daily.

The new line is known as the "Lightline." It is the second built to deliver crude to deep-water shipping terminals on Paraguana Peninsula. Creole's 26-in. to Amuay was finished in 1949. Creole now has a project to build a second parallel 26 in.

Brazil Studying Refinery

Brazil's National Petroleum Council is studying the construction of a small refinery of about 2,000 bbl. daily to be located at Manaus on the Amazon River.

The plant would serve the requirements of this central Brazilian re-

gion and probably would draw its crude supply from Agua Caliente field in Peru. This field, which is operated by Cia. de Petroleo Ganso Azul, is located on the Ucayali River near the headwaters of the Amazon. The field produces about 500 bbl. daily from six wells, but its potential is much greater.

The Brazilian Petroleum Council has long considered the construction of a refinery at Belem near the mouth of the Amazon. On Brazil's Atlantic Coast, the council is building a major refinery of about 45,000 bbl. daily capacity at Cubatao near Santos.

Creole Testing Guanoco 2

Further testing is being carried out in Creole Petroleum Corp.'s Guanoco 2 well in Eastern Venezuela which is reported to have found production in the Cretaceous at around 5,000 ft.

No official results on the well have been disclosed but it is reported to have shown a relatively small production of heavy oil. Interest centers in the possibility of light-oil production such as was tested in the No. 1 well last year.

The Guanoco 2 test was taken to a total depth of 8,656 ft. and is understood to have topped the Cretaceous at around 4,700 ft. The location is about 10 miles east-northeast of the No. 1 in the difficult swamp country of eastern Sucre State about 35 miles northeast of Maturin and about 20 miles east of Caripito.

The No. 1 well was taken to 6,198 ft. and showed both light and heavy oil below 2,300 ft. The country where these wells have been drilled is a low coastal bog with numerous watercourses. The locations are on stilts. Some of the world's largest oil seeps have been known for many years in the Guanoco area.

The general Gulf of Paria region is attracting considerable interest, both as to its submerged prospects and on the Trinidad and Venezuelan coasts. Bids for certain Gulf of Paria acreage were understood to have been submitted in the recent negotiations with the Venezuelan Government. Operators in Trinidad have been exploring offshore, though the only underwater production developed thus far has been extensions of existing land fields.

FAR EAST

India Company Formed

A new company, Burma-Shell Refineries, Ltd., has been organized by Burmah Oil Co., Ltd., and the Royal Dutch-Shell organization to operate the 30,000-bbl. daily refinery to be built at Trombay, near Bombay, India.

The company will be incorporated as a private company but will be converted to public holding company later. Burmah-Shell reached agreement in December with the Indian Government for the construction of the refinery, to cost the equivalent of about $46,000,000 and be completed in 1956.

Under terms of the agreement, £1,500,000 of the shares of the Indian operating company will be offered to Indian investors in the form of cumulative preference stock. This may be raised to £2,250,000 sterling if the Indian Government wishes. Another feature of the agreement is a government guarantee against nationalization or compulsory acquisition for 25 years.

MIDDLE EAST

One Search Less

Reports say Superior will halt Persian Gulf program

ONE of the two exploration programs being carried out by independents in the Persian Gulf is about to fold up.

Reports are that Superior Oil Corp. will pull out of the gulf within the next few months. Superior is the majority owner and operator of International Marine Oil Co., Ltd., which has been doing geophysical work in the offshore waters of Qatar and the Trucial Coast. The other interest in International Marine Oil is held by Central Mining Corp. of South Africa.

Superior's withdrawal would leave but one operation in the Middle East not affiliated with the major international oil companies. This is the American Independent Oil Co.-Pacific Western Oil Co. exploration which is going ahead in the Saudi Arabian-Kuwait Neutral Zone.

Superior is now in the midst of negotiations with Central Mining which will change the present contract. While no official statements have been made, it is understood the result will see either or both partners out of the Persian Gulf. There is some possibility Superior may wind up with a minority interest but not as the operating company.

Background.—International Marine Oil was organized August 5, 1949, and incorporated in Canada. Its rights in both Qatar and Abu Dhabi, a Trucial Coast shaikhdom, were obtained only after legal controversies. Action of the Qatar shaikh in granting the concession was contested by the Iraq Petroleum Co., Ltd., organization which contended its original concession covered all areas. Arbitration of this and the subsequent similar Abu Dhabi case gave the Superior affiliate the oil rights beyond three nautical miles.

The company set up headquarters in Manama, Bahrein, and began geo-

Foreign Guests at Nomads Meeting

These oil men and others were the guests at the April meeting of the Los Angeles chapter of Nomads. Front row, left to right, are P. K. Bunke, Texas Petroleum Co., Venezuela; G. H. Atkins, Basrah Petroleum Co.; Jean Bosson, commercial attache of the French government; and A. C. do Lago, Brazilian consul. In the center row are Joe Streeter, of the oil division of the Canadian Bank of Commerce, Calgary; J. R. Ramirez, California Texas Oil Co., Ltd., Sumatra; A. M. Thornton, Shell Oil Co., Colombia; Pierre Maillet, S.N. REPAL, Algeria; and M. Ricaud, S.I.C.A., Algiers. Back row, Dan Dodge, Kuwait Oil Co.; Elwyn Fogelberg, Kuwait Oil Co.; R. Ragland, N. V. Caltex Pacific Co.; C. C. Dorsey, Arabian American Oil Co.; and Byron Adams, Texas Petroleum Co., Venezuela.

physical work the latter part of 1950 in water depths ranging from 20 to 60 ft. It has been using four vessels, and had Robert H. Ray under contract for seismograph and gravity work. No drilling has been done.

Reasons for Superior's decision are not known, but there are many recognized difficulties of operating in this region. Though the submerged possibilities of the Persian Gulf are favorably regarded by many geologists, whatever production might be obtained would be considerably more expensive from the over-water locations.

Boundaries indefinite.—Although the arbitration decisions settled the Superior concessions insofar as the shaikhs had the power to grant them, the general boundary claims in the Persian Gulf are still in dispute. One effort to settle these claims, involving the various shaikhs and the Saudi Arabian Government, failed last year, and nothing was decided in a more recent attempt. These conflicting assertions of sovereignty could seriously affect the concession areas.

The program in the Neutral Zone is being carried out by American Independent as the operator. Four unsuccessful tests have been drilled, and the company is reported to have a new location along on the coast near the Saudi Arabian border. This is not far from Arabian American Oil Co.'s Safaniya field now being developed offshore a short distance south of the Neutral Zone.

Iraq Offers Royalty Crude

The Iraq Government has announced it is open to offers for the purchase of its 12½ per cent share of the crude production of Iraq Petroleum Co., Ltd., in Iraq.

Under the recently ratified agreement, Iraq receives an eighth of the crude produced as a part of its 50 per cent share of profits of the company. The government has the option of selling this oil on the open market or it call on the company to buy it back at posted seaboard prices.

Announcing the government's readiness to sell its royalty, the minister of economics in Baghdad said would-be purchasers have until the end of May to make offers. The government said it would have available for sale 2,650,000 tons from Kirkuk field, 162,500 tons from Ain Zalah field (Mosul) and 350,000 tons from Zubair field.

International Briefs

The Dundee refinery of William Briggs & Sons, Ltd., is being expanded by the erection of a new distillation unit for processing Venezuelan crude. The main fractionating tower is 81 ft. long, has an inside diameter of 5 ft., and weighs 13 tons. Present equipment has a capacity of about 700 bbl. daily of topped crude.

H. S. Gibson, managing director of Iraq Petroleum Co., Ltd., arrived in Baghdad, Iraq, recently for what was reported would be discussions with the government on outstanding matters not covered by the newly ratified 50-50 profit-sharing agreement.

Shell-D'Arcy Development Co. of Nigeria is now below 8,600 ft. in its deep test in the Owerri area of Nigeria. The well has drilled some sand and encountered shows of gas at an undisclosed depth. The Owerri well, 70 miles north of Port Harcourt in the Niger River delta, is the company's first deep test.

Esso Export Corp. has reduced its posted market prices for ex-terminal deliveries of marine fuel oils at Montevideo, Uruguay, to $3.95 per barrel for bunker fuel and $5.15 per barrel (42 United States gallons) for diesel fuel.

SOUTH PACIFIC

Marketing Trend

New Zealand halts move to exclusive-dealing stations

STRONG action by the government has halted oil-company efforts to obtain exclusive-dealing service stations in New Zealand.

The trend toward single-brand stations has been a major foreign marketing development in several important consuming countries, including the United Kingdom, in recent years.

In New Zealand competition among the marketing companies resulted in sharp competition for the better stations, and reports from Wellington said prices as high as £60,000, or about $167,000, had been paid by the companies in the scramble for small privately owned stations.

The company representatives were called into a conference by Prime Minister Holland and threatened with regulation if the practice did not cease. The companies agreed. The New Zealand Government is interested in the oil business directly through its 51 per cent holding of British Petroleum Co. of New Zealand, Ltd. Anglo-Iranian Oil Co., Ltd., holds the other 49 per cent.

Considering the fact that it has a population of only about 2,000,000, New Zealand is one of the best motor-fuel markets in the Far East. The automobile is used widely, and the ratio of gasoline to the total inland oil trade is one of the highest of any of the larger consuming countries. In 1950, gasoline consumption was 491,000 tons (slightly more than 10,000 bbl. daily) against a total inland consumption of 788,500 tons (about 16,000 bbl. daily). Consumption last year increased considerably over these figures.

In Britain, the development of exclusive dealing stations under what is known as the "tied house" policy, has been most marked. It is estimated that about three-quarters of the stations with two or more pumps have entered into agreements with one of the five leading British marketing companies. In its recent annual report, Standard Oil Co. (N.J.) commented that Esso's efforts to obtain distribution through single-brand dealers was a radical departure from previous marketing practices in Great Britain which has resulted in improved service to the public and lower distribution costs.

A.I.O.C. Plans Cat Cracker

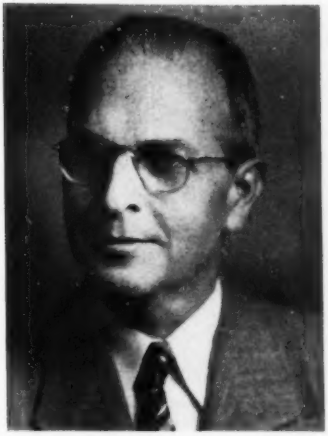
Catalytic cracking facilities will be included at the new 60,000-bbl. daily refinery which Anglo-Iranian Oil Co., Ltd., is preparing to build at Kwinana about 12 miles south of Fremantle, Australia.

Further details of the project were disclosed following the Western Australian Parliament's ratification of the agreement for the plant construction. Its cost will be about 40,000,000 Australian pounds, or about $90,000,000.

The plant will comprise atmospheric and vacuum distillation units with the usual treating plants. The new refinery will require about 500,000 lb. of steam and 5,000,000 gal. of sea water for cooling hourly. Power house, maintenance shops, stores, and laboratory equipped with test engines for product control will be built. Steel requirements are placed at 80,000 tons, of which 20,000 tons will consist of piping of various sizes up to 60 in.

The site is geographically favorable for tankers from the Middle East and being near Fremantle will be able to supply one of Australia's main bunkering stations. The refinery site is approximately 900 acres of ground well above sea level, with good loading-bearing properties, and alongside deep water where 28,000 and 32,000-ton tankers will be able to discharge and smaller tankers load products for movement to other Australian and New Zealand ports.

The Western Australian Government has agreed to make the land available, supply water and electricity, lay roads and railways to the site, carry out the necessary dredging of the water channels, and to build nearby 1,000 houses for future employes.



Now Sinclair Veep

Judd's career a combination of government and business

ORVILLE D. JUDD, now a vice president of Sinclair Refining Co., would probably be back in government service in the event of another war, if the future can be judged by the past.

During World War I Judd served in the navy. World War II found him working with the Office of Price Administration, and a few months after the start of the Korean "emergency," Judd again was in government service, this time in the Office of Price Stabilization.

Judd entered the oil business in Oklahoma and Texas in 1919 after resigning from the Navy. He owned a drilling company which operated two rotary drilling rigs and three standard rigs. He also operated a 1,000 bbl. refinery and brokerage and marketing organizations to handle oil properties and market refinery products.

After the death of his father, Judd returned East and later joined Motor Dealers Acceptance Corp., a Studebaker subsidiary, as district manager in Chicago. He still retained oil-production interests in Texas.

In 1929 Commercial Investment Corp. purchased Motor Dealers, and within one year Judd was advanced from district manager to assistant vice president—and given the assignment of liaison representative between the company and automotive industry.

He held this position until March 1942 when he secured leave of absence to join the Government to accept an assignment in the Office of Price Administration as a business specialist in the petroleum branch. In April 1943 he was advanced to price executive, and in March 1944 was appointed associate director of the fuels division. He resigned at the end of the war, but at the request of Chester Bowles remained for 60 days in order to formulate plans for decontrol procedure.

In August 1945 he entered business for himself in Richmond, Va., as a retail and wholesale food dealer. In 1949 he was elected president of the Virginia State Restaurant Association, and in 1950 became chairman of the board.

In December 1950 he sold his business interests and returned to Washington as a petroleum consultant to help set up the petroleum division of the Office of Economic Stabilization. On May 1, 1951, he was appointed chief of the petroleum branch, a position he held until joining Sinclair Refining in December 1951.

Ernest Pou, district drilling superintendent for The Texas Co. at Casper, Wyo., has been transferred to Glendive, Mont., in charge of the company's recently increased drilling operations in that area.

D. H. Graham, president of Dunlap & Graham, Inc., Los Angeles drilling contractors, is scheduled to leave for Peru late this month. During his 6-week stay he will check on drilling operations the company is performing for the Peruvian Government in the Zorritos area.

M. D. Louk, formerly gas engineer with Lomita Gasoline Co. at Signal Hills, Calif., has resigned to join Hancock Oil Co. at Long Beach, Calif.

O. B. Dortch, tool pusher for Miami Drilling Co., has been transferred from Grayville, Ill., to Abilene, Tex.

M. E. Grant, manager of transportation and supplies for Shell Oil Co., New York, has been elected executive vice president of Plantation Pipe Line Co. He will take over his new duties July 1. Grant has been with Shell since 1930 and is presently a director of Inland Pipe Line Corp.

George F. Getty, II, division manager in Midland, Tex., for Pacific Western Oil Co., has been elected a member of the board of directors of Skelly Oil Co. He takes the place of **Fero Williams,** of Los Angeles, who resigned.

W. G. Tierney, vice president and general manager of Derby Oil Co., has been elected president. Others elected executives include: **E. Wasser,** executive vice president and secretary; **F. W. McCurry,** vice president in charge of manufacturing and research; **C. A. Keller,** vice president in charge of sales and marketing; **E. C. Claiborne,** treasurer; and **L. M. Woodward,** assistant secretary-treasurer.

Dale Nix and **J. C. Stirton** have been elected vice presidents of Arabian American Oil Co. Nix, who will be in charge of technical and supply services, has been with Aramco since 1940 as manager of the producing, pipeline, and transportation department.

DALE NIX

J. C. STIRTON

Last year he was made general manager of oil operations. Stirton will be in charge of engineering and construction. In 1919 he joined the engineering department of Standard Oil Co. (Ind.), transferring to Standard of California in 1920. He became chief engineer for Aramco in 1944. **E. G. Voss** has been elected treasurer of the company.

George P. Moncrief, district engineer for Sun Oil Co. in the Midland, Tex., area, has been appointed assistant production field superintendent in charge of Sun's Premont area. Succeeding Moncrief in Midland is **D. C. Brown,** former field enginer at Snyder, Tex. **C. E. Rogers** is the new field engineer at Snyder.

LeRoy H. Hines, assistant to the vice president of Standard Oil Co. of California, has been elected vice president of Northern Pacific Railway Co. in charge of development. Hines has been with Standard since 1935, and prior to that he was employed in the oil and gas leasing division of the U. S. Department of Interior at Washington.

Steve Wagner, general manager of the **George S. Engle** oil interests at Evansville, Ind., has resigned and will operate independently in that area.

Bert B. Thompson, engineer with Carter Oil Co. at Grand Rapids, Mich., has been transferred to Mattoon, Ill.

Clark N. Barton, vice president of Lion Oil Co., has been elected to the

PERSONALS

board of directors of the First National Bank of El Dorado, Ark. Barton joined Lion in 1929 as a pipefitter helper, became a director in 1937, and elevated to the post of vice president in 1947.

M. B. Hanson, formerly assistant district geologist with Phillips Petroleum Co. at Shreveport, has joined the geological department of Chicago Corp. at Corpus Christi, Tex. He had been with Phillips 13 years.

Ward Austin has been named district geologist for Cities Service Gas Co. in Casper, Wyo. He replaces **Bill Brinker,** who left the firm to open offices for Hancock Oil Co. in Billings, Mont.

Cyrus W. Magalis has resigned as Gulf Coast district geologist for Midstates Oil Corp. at Houston to open consulting geological offices. He will specialize in exploration, development, and evaluation.

H. O. Amadon, district exploitation engineer in the Delta, La., district for Shell Oil Co., has been transferred to the technical services group at Houston. Other changes include: **D. M. Fink,** exploitation engineer at New Orleans, promoted to laboratory supervisor; **W. E. Harpst,** chief mechanical engineer, transferred from New Orleans to New York; **J. B. Lewis,** laboratory supervisor at New Orleans, transferred to Donaldsville, La., as exploitation engineer; and **J. H. Williams,** exploitation engineer at Franklin, transferred to Delta district as district exploitation engineer.

Paul D. Balbin has been named to head Stanolind Oil & Gas Co.'s geophysical operations in the North Texas-New Mexico division. Balbin was formerly geophysical supervisor in Stanolind's Tulsa general office, and is being transferred to Fort Worth due to the expanded geophysical activities in that division. He has been with the firm since 1938.

Russell F. Klinger, geologist for Stanolind Oil & Gas., who was recently transferred to Casper, Wyo., has resigned and returned to Houston to open consulting offices.

James L. Ballard has joined Canada Southern Oils, Ltd., as chief geologist. He was formerly associated with Tide Water Associated Oil Co.

William J. Childress, Jr., formerly petroleum engineer with Pan American Production Co. at Houston, has joined Texas Production Co. at Caracas in a similar capacity.

EXECUTIVE BECOMES OLD-TIMER.—T. H. Webb, center, resident vice president for The Texas Co., just after receiving his Texaco 25-year pin at the Los Angeles party celebrating the company's fiftieth anniversary. Twenty-five year men with him are J. H. Puls, left, West Coast production manager, and D. E. Beaton, Pacific Coast sales manager.

Earl Fry, formerly geologist for Pan American Oil Co., has joined **John W. Mecom** at Houston.

Leonard Wickenhauser, formerly petroleum engineer with Mene Grande Oil Co. in Venezuela, has joined Manabi Exploration Co. in Ecuador.

Herman L. Shaw has been elected president and general manager of Shaw Oil & Chemical Corp., Boston. He was formerly president of H. L. Shaw & Sons, Inc., and has had many years of experience in the chemical industry.

James E. Keenan has been appointed assistant supervisor of exploration for the Rocky Mountain division of General Petroleum Corp. **C. E. Carlson** succeds Keenan as district geologist for Montana, with headquarters at Billings. Keenan will be located in Casper, Wyo.

Rudolph Schider has been elected a director of Mazda Oil Corp., a subsidiary of National Phoenix Industries, Inc. For 30 years Schider was a leading geologist in the Royal Dutch Shell group, serving also as production manager and vice president in charge of operations of Mexican Eagle Oil Co. and special consultant to Asiatic Petroleum Corp.

Richard A. Mathews, formerly field communication engineer with Salt Lake Pipe Line Co. at Salt Lake City, has joined Standard Oil Co. of California as communications engineer at San Francisco.

Duane C. Randall has been appointed senior geologist in the petroleum department of Chase National Bank, New York. Randall started his career in the oil business in 1937 with Carter Oil Co., becoming head of the firm's crude-oil reserves section in 1940. In 1942 he joined Standard Oil Co. (N. J.) as an analyst, leaving in 1944 to join Creole Petroleum Corp. In 1948 he became associated with Continental Oil Co. as senior analyst in the coordinating and planning department.

Joseph C. Kiker has joined Texas Petroleum Co. in Caracas, Venezuela, as petroleum engineer. He was formerly in the gas division at Houston of the parent firm, The Texas Co.

F. H. Taylor has been appointed district superintendent in charge of the newly established Shell Oil Co. office at Glendive, Mont. His staff will include: **R. H. Woodward,** district exploitation engineer; **W. E. Spear,** district mechanical engineer; **E. A. Wick,** purchasing and stores manager; and **F. A. Sikes,** production foreman. Drilling foremen will be: **H. H. Brigham, W. C. Thompson, E. T. Mooney,** and **M. D. McCollim.**

W. V. Cropper has been promoted to assistant chief chemist of the Standard Oil Co. (Ind.) research laboratories at Whiting, Ind. He has been succeeded as group leader at the company's Casper, Wyo., laboratory by

PERSONALS

H. M. Schauer, formerly chemical engineer at Whiting. Cropper joined Standard in 1942 as a chemist at Whiting and was transferred to Casper in 1944, becoming group leader in 1946. Schauer has been with the firm since 1946.

J. G. Leach has been named senior technologist to assist in the process department of Shell Oil Co.'s head office in New York. Leach joined the firm in 1944 at the Montreal refinery laboratory, and was transferred to the newly formed refinery technological department in 1946. **G. Stegmayer** has been appointed supervisor of formulation and products surveys at the Montreal refinery laboratory. He has been with the firm since 1947. **A. V. Doyle** has been transferred to the Montreal refinery to serve as senior assistant to the chief technologist.

Charles O. Davis, who has been with Pure Oil Co. for 27 years, will become superintendent of operations in the Michigan division of Pure Transportation Co. Now assistant superintendent of the division, Davis will succeed **C. L. Bernard,** who will take up increased responsibilities in the company in Oklahoma. **Clair E. Cox** will succeed Davis as assistant superintendent. Davis and Cox will headquarter in Mount Pleasant.

Robert L. Overhuls, formerly a research assistant in the college of engineering of the University of Oklahoma, has joined Ashland Oil & Refining Co. at Henderson, Ky., as a petroleum engineer.

T. C. Twyman has been elected president and chief executive officer of McColl-Frontenac Oil Co., Ltd., and **G. R. Taylor** succeeds Twyman as executive vice president. **J. M. Pritchard,** former president of the company, has been elected chairman of the board, succeeding **A. A. MaGee,** who

G. R. TAYLOR

A. A. MAGEE

now becomes chairman of the executive committee. **C. C. Dunn** was re-elected vice president in charge of sales, and **A. G. Farquharson** was elected vice president in charge of refining. **T. V. Anderson,** former treasurer and comptroller, is now vice president and treasurer, and **Fred Hunt** was reelected secretary.

George H. Galloway, assistant geologist in charge of programs for Stanolind Oil & Gas Co. at Tulsa, has been appointed manager of the Canadian division of the company.

Roy D. McAninch, formerly chief geologist for Consolidated Gas Utilities Corp. in Oklahoma City, has entered the consulting field with offices in Oklahoma City.

Wayne B. Glenn, of Continental Oil Co., has been elected chairman of the Pacific petroleum chapter of the American Institute of Mining and Metallurgical Engineers. **J. Shannon Baker,** of Lane-Wells Co., was elected secretary-treasurer; and **J. A. Klotz,** California Research Corp., was elected corresponding secretary.

H. M. McDonald, superintendent of pipe lines, will succeed **E. A. Koenig** as general superintendent of Texas Eastern Transmission Corp. while Koenig is serving as chief of the gas-transmission branch of the Petroleum Administration for Defense, gas operations division, in Washington.

D. T. Staples has been reelected president of the Oil Producers Agency of California. **Rush M. Blodget,** who has been executive vice president of the organization continuously for its 20-year life, has retired, and **Stark Fox,** Blodget's assistant for many years and more recently a vice president, was elected to succeed him. Other officers elected are: **William S. Comstock,** of Franco-Western Oil Co.; **W. H. Geis,** consulting engineer; and **R. A. Grant,** of Fullerton Oil Co., vice presidents; **W. A. Russell,** of Seaboard Oil Corp., secretary-treasurer; and **Verne Harrell,** of Bankline Oil Co., assistant secretary-treasurer.

G. G. DORMER

George G. Dormer has been named assistant chief engineer for Manufacturers Light & Heat Co. and associated Pittsburgh Group gas companies in the Columbia Gas System. Since 1948 Dormer has been the assistant superintendent of the Group's production-transmission division No. 7 with headquarters in Binghamton, N. Y. He is now making his headquarters in the Pittsburgh general offices and aids **A. B. Lauderbaugh,** recently named chief engineer, in supervising gas-company engineering programs.

Ralph F. Jones and **Daniel A. Weber** have been elected directors of Sunset Oil Co., succeeding **Harry Freidman** and **Harold Fendler.**

DEATHS

Max Steineke, 54, chief geological consultant to Arabian American Oil Co., San Francisco, died at Los Altos, Calif., April 16. Last year Steineke was awarded the Sidney Powers Memorial medal, the highest honor in the science of petroleum geology. This award of the American Association of Petroleum Geologists gave public recognition to Steineke's signal success in discovering and developing vast oil resources in Saudi Arabia.

William N. Cottrell, 64, division purchasing agent for Esso Standard Oil Co., died April 14 at Baton Rouge, La. He had been with the firm for 31 years.

Charles G. Worthy, 62, superintendent of production for Magnolia Petroleum Co. at Luling, Tex., died April 12.

Joe Baker Tims, pipe-line superintendent for Lion Oil Co., died April 9 at El Dorado, Ark. Tims had been with Lion for the past 29 years.

H. Lee Howell, 51, independent operator at Houston, was killed in an automobile accident recently.

Jake Lieberman, 74, oil lease broker who helped develop the Stroud, Okla., field, died while on a business trip to Salt Lake City, April 11.

R. W. Graham, 53, independent oil operator of Ballinger, Tex., died while on a business trip to Midland, Tex., April 13.

William Peyton Mason, 83, pioneer oil man, died April 6 at Long Beach, Calif.

Frederick McAlpine Hutchinson, 67, retired oil operator at Houston, died April 14.

Harry M. Durrett, 59, former head of Durrett Oil Corp., died April 13 at Tulsa.

Merle Dempsey, 61, driller, died recently in Long Beach, Calif.

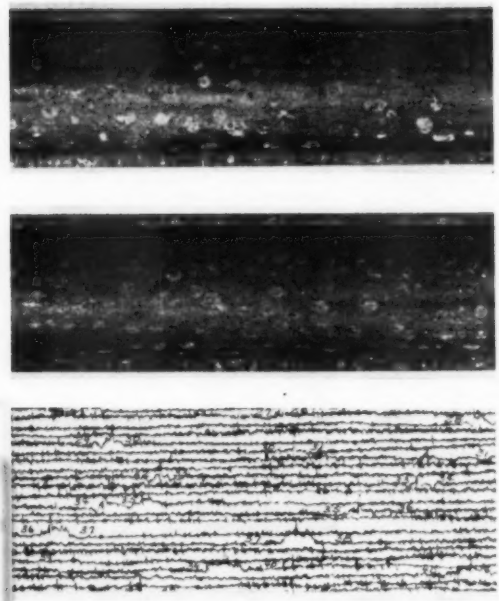


Fig. 1—Typical attack of high-pressure sweet-oil-well corrosion.

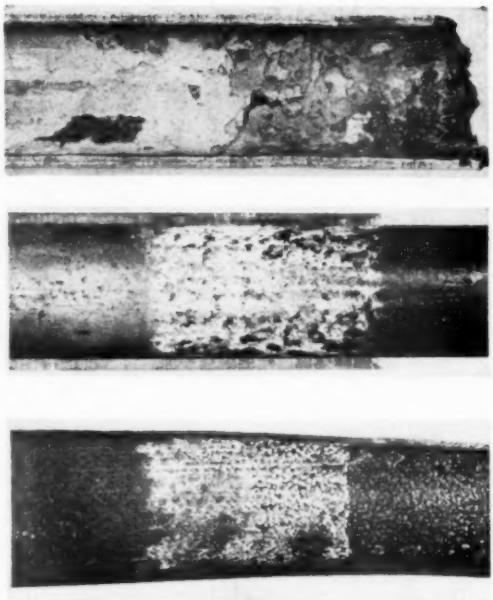


Fig. 2—Ringworm corrosion proves troublesome during workovers.

How to predict and control

SWEET-OIL-WELL CORROSION

Two types of corrosion are discussed here—low-pressure, and high-pressure—their causative agents, and some remedial measures.

by H. L. Bilhartz*

SWEET-OIL-WELL corrosion has been recognized as a problem only in recent years. Corrosion occurs at both high and low pressures, with two distinctly different types being encountered.

Severe corrosion occurs at high pressure, even where little or no water is produced, with deterioration beginning immediately after production is started. In one well in southeastern Louisiana, where a blowout occurred as a direct result of corrosion, monetary loss was $150,000, and the well was lost to production.

Low-pressure corrosion does not usually become appreciable for several years after production is initiated. Too, a critical water-oil ratio, usually in excess of 50 per cent water, must be exceeded before perceptible attack occurs.

*Atlantic Refining Co., Dallas. Presented at meeting of Southwestern District, A.P.I. Division of Production, Shreveport, La., March 5-7.

In order to study these problems and determine methods of solution some 30 companies have been working through the technical practices committee of the National Association of Corrosion Engineers.

High Pressure Project

A survey showed that general pitting (Fig. 1) similar to that experienced in condensate wells occur. An average of 75 pits per linear foot was observed in some sections of tubing removed from corrosive wells. These pits were characteristic of carbon dioxide attack. Subsequent analysis proved this acid gas to be the primary causative agent. Organic acids were detected in unusually large concentrations. It was concluded that this constituted a secondary causative agent.

The intensity of corrosion was noted to vary a great deal within a field. In rare instances complete penetrations developed in one year. On the other hand 8 or 10 years of trouble-free service experienced on offset wells. In general the average tubing life was 3 or 4 years. Ringworm corrosion Fig. 2 is isolated but proves troublesome and costly during workover operations.

Possibly the most striking observation disclosed was the fact that severe corrosion occurred in wells producing pipe-line oil. Traces of water, officially reported as 0.1 per cent, were sufficient to radically reduce tubing life. Under these circumstances it was and is difficult to explain the exact mechanism of attack. Various theories, which are beyond the scope of this paper, leave much to be desired in the way of explanation.

Scale conditions noted also defied explanation. Two types of scale (Fig. 2) were reported. One was a thick, heavy, white, cement-like material

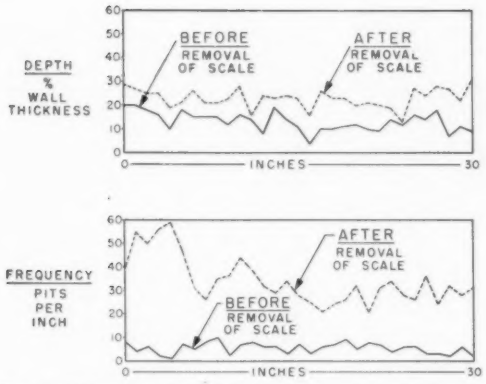


Fig. 3—Effect of scale removal on visual pit frequency and depth.

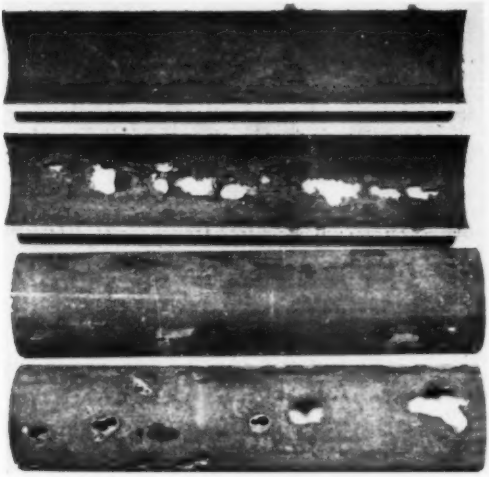


Fig. 5—Typical attack of low-pressure sweet-oil-well corrosion.

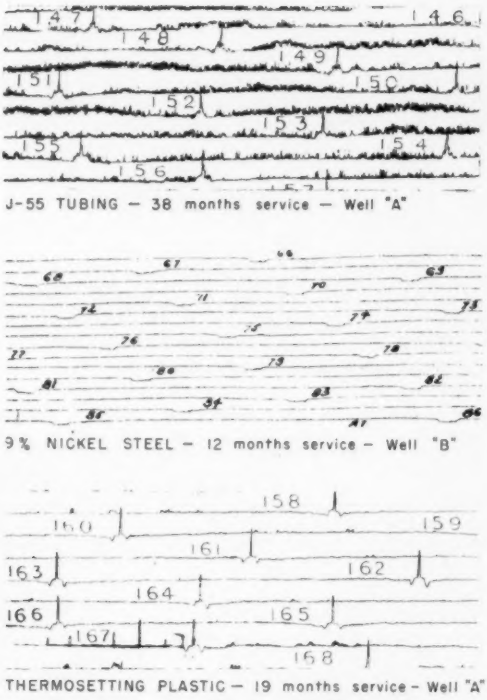

J-55 TUBING — 38 months service — Well "A"
9% NICKEL STEEL — 12 months service — Well "B"
THERMOSETTING PLASTIC — 19 months service — Well "A"

Fig. 4—Survey of pitting in three kinds of tubing.

which proved to be barium sulfate; and the other was a red oxide-appearing coating over a thin barium sulfate deposit. The red overcoating was honeycombed in appearance and very hard.

The scale deposition became of more than academic interest when it was realized that such a hard material seriously affected the results of tubing caliper surveys. Such surveys normally dictate workover operations. The effect is best illustrated in Fig. 3. A substantial increase in pit depth was measured subsequent to scale removal. In addition, the visually determined frequency of pitting increased by a factor of 10 after tubing had been cleaned of scale.

Criteria of corrosion for a given environment are always difficult to establish. It was at first assumed, because of similarity of attack, that the criteria for condensate-well corrosion would be applicable. Factors considered in these criteria were as follows:

1. Surface coupon tests.
2. Iron content determination.
3. Carbon dioxide content.
4. Organic acid content.
5. Tubing caliper survey.

Surface coupon tests in this problem proved to be of no value because of severe paraffin deposition. Iron concentration was of little significance, inasmuch as it was practically impossible to sample water produced from pipe-line oil. In wells where significant water was produced, correlation of corrosion rate vs. iron content was poor. There was a correlation with carbon dioxide and organic acids. As discussed previously, it was concluded that these two compounds constituted the causative corrosion agents.

The value of the tubing caliper, though still important, was obscured by the unique scaling conditions; thus rendering interpretation of data difficult.

Results of survey also showed that 42 per cent of the wells in high-pressure service displayed tubing corrosion, and 20 per cent of the surface equipment showed attack.

There was no correlation with age of wells, signifying that corrosion became evident very soon after production was started. A direct correlation was noted with oil-production rate. As expected from preliminary observations, no correlation was derived from per cent or total water production.

Paraffin, emulsion, and sand problems were equally independent of corrosion rate. A reasonable correlation with bottom-hole pressure was observed, with increased pressure resulting in increased corrosion. Bottom-hole temperature displayed a significant pattern. Corrosion incidence was directly related to temperature. Surface tubing pressure and gas-oil ratio displayed little related evidence.

A direct correlation existed between corrosion frequency and well depth. The latter is especially significant for several reasons. First, workover costs on these wells are particularly high; and, second, the trend is toward deeper drilling, especially in southeastern Louisiana

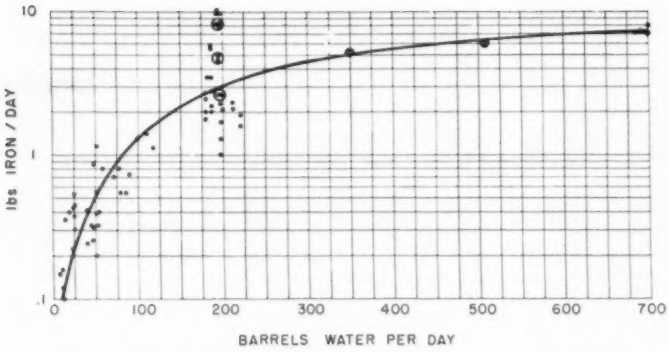


Fig. 6—Pattern for corrosion prediction—iron loss vs. water produced.

where this problem has been most prevalent. These factors would indicate that economic stakes of this problem will increase in the years to come.

The development of economical remedial measures proved difficult. Most commonly employed techniques were inadequate or could not be economically applied.

Thermosetting plastic-coated tubing was installed in some wells. Effectiveness of this measure is shown in Fig. 4. It did reduce general attack, but isolated pits began to form within 19 months. The advantage of this technique was thus subjected to some doubt because one complete penetration in a 10,000-ft. well necessitated a workover.

In all fairness to this approach, it must be emphasized that the product used during early days of test has been improved. Subsequent tests may tend to minimize the noted disadvantage. Thermosetting plastic-coated tubing costs approximately twice that of unprotected pipe. Three hundred and ten thousand feet have been installed to date in high-pressure wells.

Nine per cent nickel tubing was installed originally because of its successful use in the condensate-well environment. Approximately 100,000 ft. has been installed in one area of southeastern Louisiana. To date only minor evidence of attack has been noted. The perfect condition of 9 per cent nickel after 1 year's service is shown in Fig. 5. Nine per cent nickel tubing costs 3.8 times that of J-55. Unfortunately, this material is no longer available to the oil industry; therefore, it has become necessary to develop other methods of alleviation.

Both galvanized and nickel-plated pipe have been tested under actual in-hole conditions. Galvanizing failed immediately. Results of the nickel-plated tests are not yet available. However, the data when received, will be of academic interest since this material, too, is no longer available for use in this manner.

The use of inhibitors was at first thought to be impractical because of inherent difficulties encountered in releasing an inhibitor in the bottom of the well. Due to the high pressures involved, packers and mud-filled annuli were almost universally accepted as necessary. Therefore, the only means of introducing an inhibitor was through the tubing. Since the tubing was always full of produced fluid, it was necessary that weighted stick inhibitors be used.

The cost of adequate treatment in many instances equals that of replacing tubing every 3 or 4 years. With the shortage of steel rendering economic considerations to a status of secondary importance, however, several companies are utilizing this method of mitigation. It is hoped that developments iin this field of endeavor will improve the economic picture. In the meantime, every effort is being made to extend the life of tubing now in place through the duration of the national emergency.

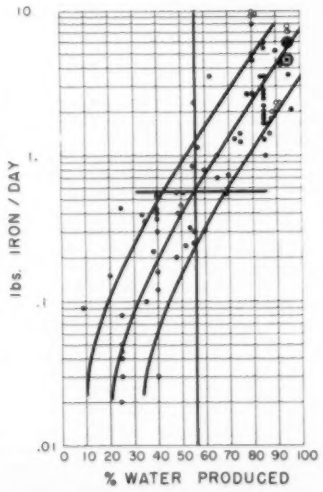


Fig. 7—Pattern for corrosion prediction—iron loss vs. water per cent.

Low-Pressure Project

The second of the two problems, low-pressure sweet-oil-well corrosion, was first observed only 2 years ago. (This type of attack is illustrated in Fig. 5). Literally hundreds of holes developed in as little as 9 months. Due to the rather strange conditions surrounding the initial observations, little thought was given to its potential seriousness. Instead, it was thought that some freak attack had occurred which would be isolated.

As more and more reports of failures were made the seriousness of the situation became alarming. The unique factor which characterized this phenomenon was essentially that wells produced 10 to 15 years with no symptom of corrosion. After this period of trouble-free operation, an unexplained change occurred which reduced the tubing life to 2 years or less in many instances.

The survey of corrosion in low-pressure wells has not been completed. However, it has been noted from preliminary data that:

1. Corrosion does not occur below some critical water-oil ratio.
2. The extent of corrosion after the critical value has been exceeded varies according to fluid velocity and total corrodent.
3. Gas-lift accelerates corrosive attack.
4. Organic acids are probably the most active corrosive agents. Carbon dioxide may also be significant.
5. Inhibitor injection is, in general, the most economical remedial measure.

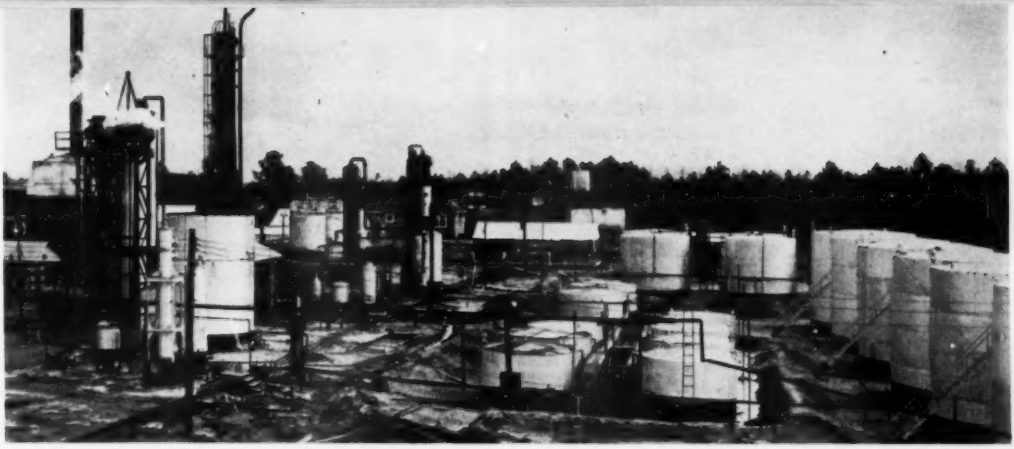
As concerns remedial measures employed to date, the customary injection of organic inhibitors into an open annulus has afforded protection in many instances. Conditions existing in other locations render this technique valueless. For example, the inhibitor does not penetrate the high fluid level in many wells, with the result that protection is not attained in lower zones.

This problem is being attacked in several ways. Water-soluble inhibitors with a specific gravity greater than brines are being tested. Commonly available stick inhibitors have been lubricated down the tubing. This practice has met with difficulties in wells where the bottom-hole temperatures are too low to melt the binding material. Sticks which function independent of temperature have been developed and are being field tested.

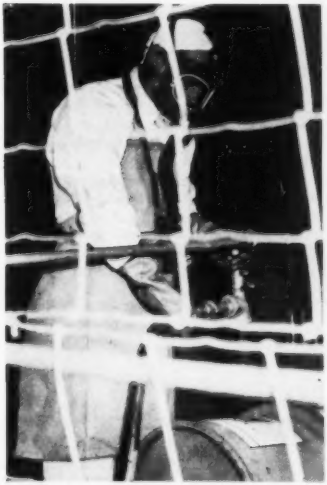
Complete test results of various techniques will be forthcoming soon. It is antjcipated that within a year successful remedial measures will be established for most conditions.

Relative to the significance of water-oil ratios, it is known that critical values will vary from field to field. Such a figure has been empirically established for several environments. In the United States all ratios to date have been greater than

(Continued on page 151)



Over-all view of Stephens, Ark., refinery of Berry Asphalt Co. Berry employes are continually encouraged to take part in the cooperative safety program. Many valuable suggestions come from the employes themselves.



Great care is taken by the operators at the Stephens Ethyl blending plant. Respirator and rubber gloves, apron and boots are worn over white uniform to detect slightest trace of lead. Wire insures presence of authorized personnel only. Plastic face masks are frequently used by laboratory personnel in carrying out tests.

How to Achieve an Enviable Safety Record

by A. T. Van Pelt*

Here's the secret of Berry Asphalt's safe drilling, production, refining, and pipe-line operations

THREE AND ONE-HALF years without a lost-time accident of any kind! This is the record compiled recently by Berry Asphalt Co., of Magnolia, Ark. Berry employes in all phases of the oil business are extremely interested in safe operation and accident prevention.

*Vice president, Berry Asphalt Co., Magnolia, Ark.

It is a belief of company administrators that they should not be too cost conscious. They feel that effective operations are best conducted by employes working under safe conditions. A sloppily run business, where men are injured frequently, is not conducive to economy—in the oil industry or anywhere else.

Berry Asphalt Co. operations include drilling, production, pipe lining, and refining. The crude is piped to the company refineries at Waterloo and Stephens, Ark. The Berry plants refine and process a variety of asphalt and petroleum products.

Safety Program Initiated

A few years ago the company's accident picture was getting out of hand, in spite of all efforts. Men were getting careless and getting hurt too often. To alleviate this situation an

Gloves and extreme caution are "musts" in this operation. Asphalt pours into these cartons at 350° F.

Caustic mixing operations are carried out using full protective regalia, from head to foot.

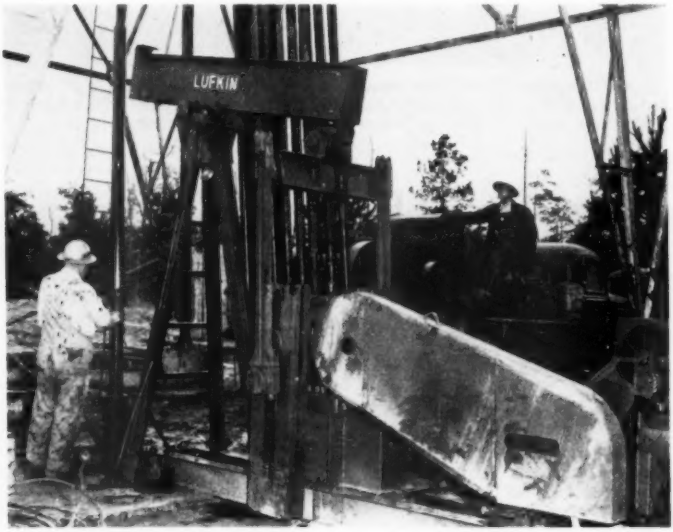
appeal was made to the engineering staff of Employers Mutual of Wausau, the company insurance carrier, for the formulation of a plan to improve the safety situation.

Employers engineers pointed out that while the desire for safety and cooperation on the part of management was a prime factor in the development of any safety program, the continuing success of any safe working program depended on the interest and enthusiasm of the employes themselves. Recommendations, therefore, included regular meetings attended by all operating employes. These meetings are for the purpose of discussion of safety subjects pertinent to company operations, the view of safety films, and a complete analysis of recent accidents. This latter subject is discussed, not with the idea of placing blame, but to discover if better guarding of equipment or better working practices can be set up to avoid repetition of the accident.

Over 100 production workers attend these meetings every other month at the Waterloo refinery, and approximately half that number in the intervening months at the Stephens refinery. On the nights of these meetings, which are held in the afternoon, all foremen and supervisory employes meet with management for a safety dinner at the Magnolia headquarters of the company. This dinner is the occasion for a full discussion of the safety situation and approval of suggested changes.

As a result of these activities, company operations have been carried on for as long as 3½ years at a time without a lost-time accident of any kind. Employes are more conscientious about wearing proper protective equipment. Many valuable suggestions come from the workers themselves.

The operating men show an earnest and sincere desire for safe working conditions and for the protection of each other. Employe spirit and morale have risen to new heights. Many of the supervisors have driven over 60 miles, sometimes in inclement weather, to be present at the evening meeting in Magnolia—this after a hard day's work. Some have not missed a meeting in 4 years.



Dragging sand pump from newly drilled well. Safety on a job like this depends on protected equipment, know-how, care, and worker coordination.

The author confers with C. L. Crenshaw, Stephens refinery manager.

clean or dirty

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clean or dirty

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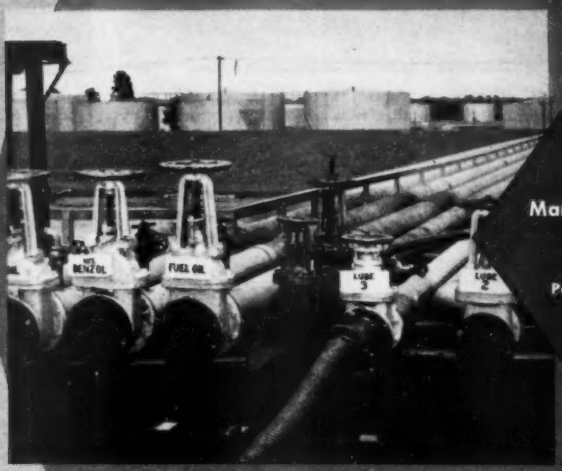

5 TANK STORAGE TERMINALS . . .

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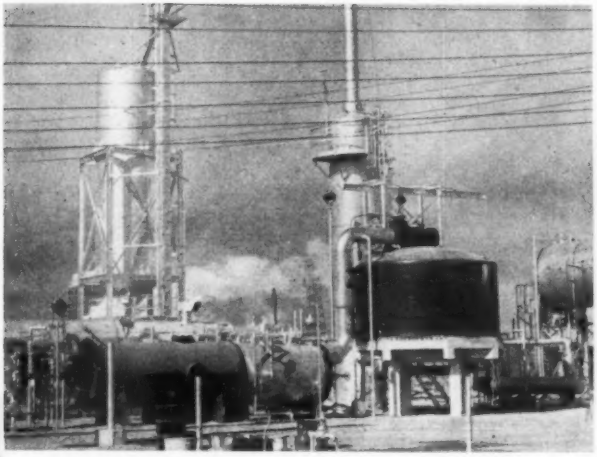
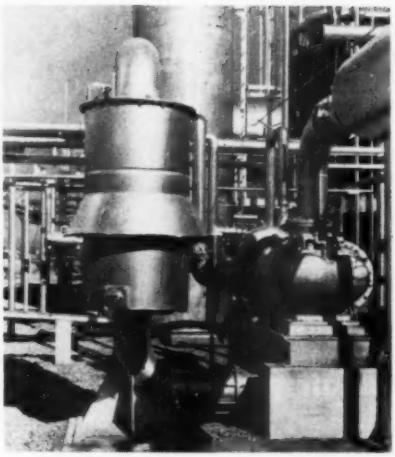
TANK STORAGE TERMINALS GENERAL AMERICAN TRADE MARK



Sulfur-recovery unit has compact plant layout. On left are flake sulfur storage tank and elevator, and steam boiler (foreground). Sulfur scrubber condenser (rear) and catalytic converter (right).



Combustion air for H_2S oxidation is delivered by blower to steam boiler. Rate of flow is ratio controlled.

West Texas' First Sulfur-Recovery Unit

Waste acid gas from amine treating unit processed in this Permian basin plant

by H. H. Jones* and R. A. Graff†

SID RICHARDSON CARBON CO. and Odessa Natural Gasoline Co. recently placed in operation a 20-ton per day sulfur-recovery unit, which is the first recovery unit to go into operation in the Permian basin area of West Texas. The Permian basin is a potential source of several hundred tons of sulfur per day, and the Sid Richardson-Odessa Natural plant operation is the forerunner of several such sulfur-recovery units.

*Sid Richardson Carbon Co., Fort Worth, and †Graff Engineering Co., Dallas.

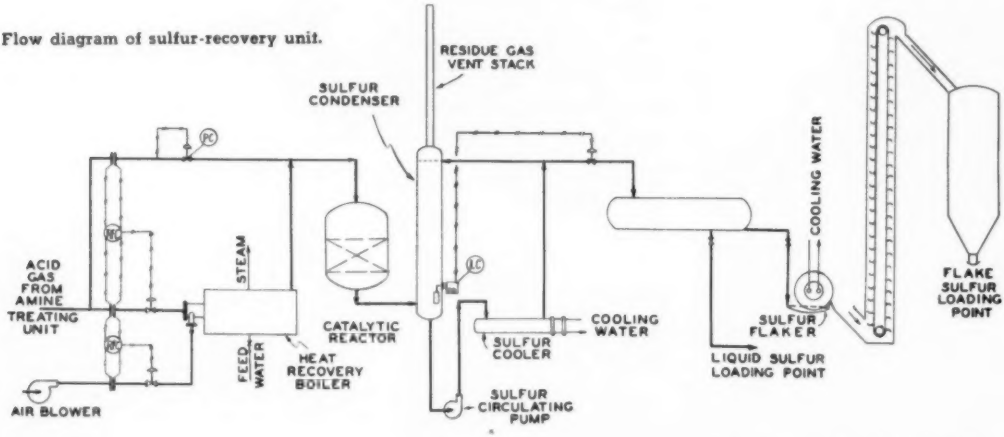
Previous estimates by major oil companies indicated that a 50-ton per day hydrogen sulfide-recovery plant was the minimum size that could be economically operated; however, the operation of this plant definitely indicates that a profitable operation can be obtained at lower rates.

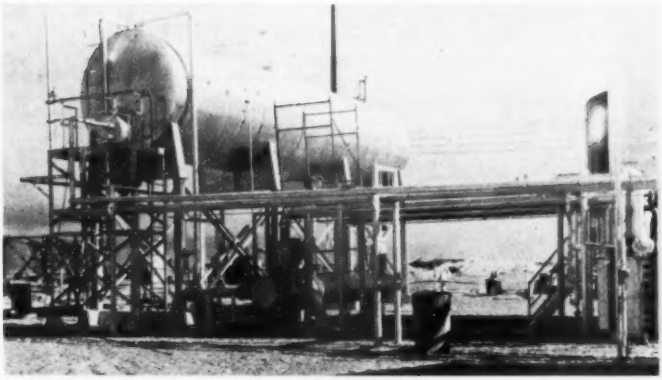
This sulfur-recovery unit is operated in conjunction with the Sid Richardson Carbon Co. amine-type residue-gas-desulfurization unit, which processes residue gas from the Odessa Natural Gasoline Corp. plant near Odessa, Tex.

Conversion Process

The sulfur-recovery operation employed at this installation is a modified Claus process, and is for the conversion of hydrogen sulfide in the waste acid gas from the amine-treating unit to elemental sulfur. The hy-

Flow diagram of sulfur-recovery unit.





Liquid sulfur from catalytic converter is cooled in products exchanger (lower middle) and stored in product tank.

drogen sulfide-carbon dioxide bearing acid-gas mixture is first divided into two streams, and a one-third portion is burned in the firebox of a steam boiler with the theoretical quantity of air to produce sulfur dioxide, and this sulfur dioxide, which has been partially cooled in the steam boiler, is mixed with the remaining two-thirds portion of the acid-gas stream, and passed to a catalytic reactor, where the hydrogen sulfide and sulfur dioxide react to form elemental sulfur and water vapor.

The nature of the reactions that occur in the process are illustrated by the equations shown below:

$$H_2S + 1\tfrac{1}{2}O_2 \rightarrow SO_2 + H_2O$$
(in steam boiler)

$$2H_2S + SO_2 \rightarrow 3S + 2H_2O$$
(in catalytic converter)

The reaction products leaving the catalytic converter are cooled in a direct-contact cooler using a circulating stream of molten sulfur, and the condensed sulfur is pumped to an elevated sulfur accumulator. The waste gases, consisting of carbon dioxide, nitrogen, and water vapor are vented to the atmosphere.

This particular one-third—two-thirds process was selected for this operation due to the large concentration of carbon dioxide present in the acid gas, which would react with the hydrogen sulfide to produce carbon oxysulfide at elevated temperatures, should the entire stream be burned in the firebox. This would necessitate operating the catalytic converter at high temperatures, in order to hydrolyze the carbon dioxysulfide in the catalytic converter, thereby resulting in poor equilibrium conversion conditions, and the addition of a second stage of sulfur conversion to produce a moderate recovery.

The present operation indicates that approximately 90 per cent conversion is being obtained in single-stage operation.

The liquid sulfur product, stored in the elevated sulfur accumulator, may be shipped in tank-truck or tank-car quantities in the liquid condition, or may be solidified in the flaked form, and stored in an elevated storage bin, prior to shipment in open-top semi-trailer truck units.

Sulfur Flaking

The conversion of the liquid sulfur to the flaked form is carried out by means of a water-cooled flaking drum unit. The bottom portion of the horizontal flaker drum is submerged in a steam-heated sulfur feed pan, and as the drum rotates, a film of sulfur adheres to the outside of the drum and solidifies. The solidified film of sulfur is continuously removed from the drum by means of a stationary doctor blade, and the flaked sulfur thus produced falls into a feed hopper, connected to the conveyor system supplying the elevated storage bin.

Liquid sulfur is delivered to the flaker. As drum rotates, adhering film of sulfur solidifies and is flaked off by doctor blade.

The flaked sulfur in the storage bin is available for gravity loading into motor trucks.

The rate of sulfur flaking is determined by the speed of rotation of the flaker drum, and also the height of submergence of the sulfur feed pan. The drum speed and submergence can be varied to suit optimum production rates, and it is desirable to produce a thick flake product that does not contain an excessive quantity of fines. Magnetic vibrators are provided to permit free flow of the flaked sulfur product.

The sulfur produced at this plant is used largely in the preparation of insecticides, and the production of flaked sulfur greatly facilitates the handling of this product and minimizes the amount of equipment required for producing a 200-300 mesh ground sulfur product which is desirable for the agricultural trade.

Labor and Utilities

Inasmuch as the economics of moderate-size sulfur-recovery installations depend upon the amount of labor required to produce a unit quantity of product, the flaking operation almost completely eliminates the material-handling and loading problem attendant to this type of operation, and the same personnel that operate the gas-desulfurization unit find sufficient time to operate the complete sulfur-recovery unit.

The sulfur-recovery unit produces approximately 2 lb. of steam per pound of sulfur produced, and the steam produced is in sufficient quantity to operate all the drives in connection with the sulfur-plant operation. Exhaust steam is returned to the amine gas-desulfurization-unit reboiler, and is condensed at that point. No additional steam is required for this operation, and a portion of the steam required for the natural-gas-desulfurization unit is obtained from the sulfur-recovery plant, with an attendant saving in boiler fuel at the main boiler plant.

This type of operation can be termed a "captive plant" operation since boiler feed water is obtained from the existing system, and exhaust steam is returned to the existing system.

The only electric power required is that for operating the sulfur flaker drive and conveyer system, and since this is only a nominal quantity, the utility requirements for the entire system are quite low.

Cooling water required for condensation of the sulfur is obtained as hot returned cooling water from the tube-and-shell equipment at the amine-natural gas desulfurization unit.

Process Control

The entire plant operation is completely automatic, and the instrumentation of this plant consists largely of ratio flow controllers of the aneroid type, which apportion the

(Continued on page 153)

Methanol as a Hydrate Inhibitor

by

Robert M. Woolfolk, Jr.*

This report on operation of an 18-mile gas line explains how hydrate formaton was prevented by using only 1.85 gal. of methanol per million cubic feet of gas.

GAS pipe-line freezes were originally believed to be caused by formation of ordinary ice. In view of this belief, methanol was used for removal of these flow restrictions long before the nature of hydrates had been experimentally determined.

That methanol will melt hydrates in gas lines according to the law of freezing point depression is known generally today. Industry's variety of experience indicates that methanol injection for "prevention" of hydrate formation in gas pipe lines has been considered a stop-gap measure. Consequently little engineering study has been given to the use of methanol in this field. Success of the process depends on points of injection, accuracy of adjustment, and rate control and rate.

There are numerous applications for methanol injection where other methods of hydrate prevention cannot be economically justified due to their relatively higher initial cost. Among these are:

1. Gas pipe-line systems which encounter hydrate trouble for only short periods each year.
2. Gas pipe lines which operate only few degrees below hydrate temperature.
3. Gas-gathering systems in declining fields.
4. Gas-gathering systems in fields which are in development stage.
5. Small distribution systems.
6. Gas lines which encounter hydrate trouble at localized points, i.e., exposed pipe, check valves, meter runs, regulators.
7. Gas-gathering systems which have numerous entries of water-saturated gas into their trunk lines.

*The California Co., Natchez, Miss. Presented at Gas-Hydrate Control Conference, University of Oklahoma, Norman.

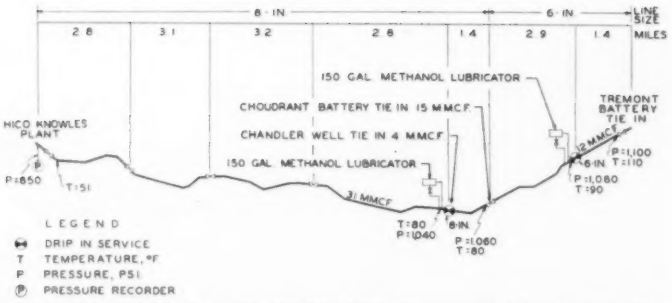


Fig. 1—Initial facilities in gas pipe line from Tremont and Choudrant to Hico-Knowles for methanol injection and control, winter of 1949-50.

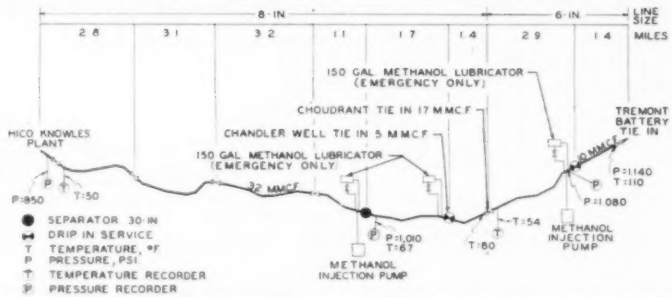


Fig. 2—Revised methanol-injection and control facilities in service during winter of 1950-51 on Tremont and Choudrant to Hico-Knowles gas line.

One case in which the hydrate problem has been solved with methanol injection is the 18-mile Tremont-Choudrant gas-gathering pipeline system which transmits wet gas from these two distillate fields to the Hico Knowles gasoline plant located at Dubach, La. This pipe line was placed in service in the early part of 1949, at which time the two fields were in the development stage and their ultimate daily gas rates as well as their expectant lives were indeterminate. It was therefore decided that a hydrate inhibitor be used to depress the hydrate formation temperature until sufficient data could be obtained to determine the most effective and economical method of treatment of the gas.

Data by Hammerschmidt[1] indicate that ammonia is the most effective hydrate inhibitor; however, it is not recommended for treatment of gases containing more than 0.1 mol per cent dioxide due to the formation of solid ammonium carbonates. Since the Tremont-Choudrant gas[2] contains 2.70 mol per cent carbon dioxide, ammonia could not be used in this system. The next most effective, economical and readily available inhibitor is methanol, which has the advantages of being noncorrosive, chemically inert to the components of natural gas, and easily handled. It was therefore decided that methanol be used as a hydrate inhibitor in this system.

Lubricators were installed downstream of the gas line drips at both Tremont and Choudrant batteries, as shown by Fig. 1, for injection of methanol into the gas line through "wicks" consisting of perforated nozzles packed with wool. This proved to be unsatisfactory for the injection rate could not be accurately adjusted or controlled by the valves on the lubricators and the wool-packed nozzles either restricted the flow or allowed methanol to pour into the line.

During the first winter season (1950-51) the methanol injection rate was adjusted primarily on the basis of line pressures and atmospheric temperatures. If the line pressure was above the normal pressure for a given flow rate, the increase was attributed to flow restriction caused by hydrate formation and the methanol injection rate was increased. The injection rate was adjusted on the basis of atmospheric temperature for the reason that the line temperature fluctuated with atmospheric conditions to a greater degree than was expected for a line buried 4 ft. in the ground. This fluctuation in line temperature of as much as 8 F. in 24 hours was probably due to new pipe ditch, the 40 ft.

(Continued on page 159)

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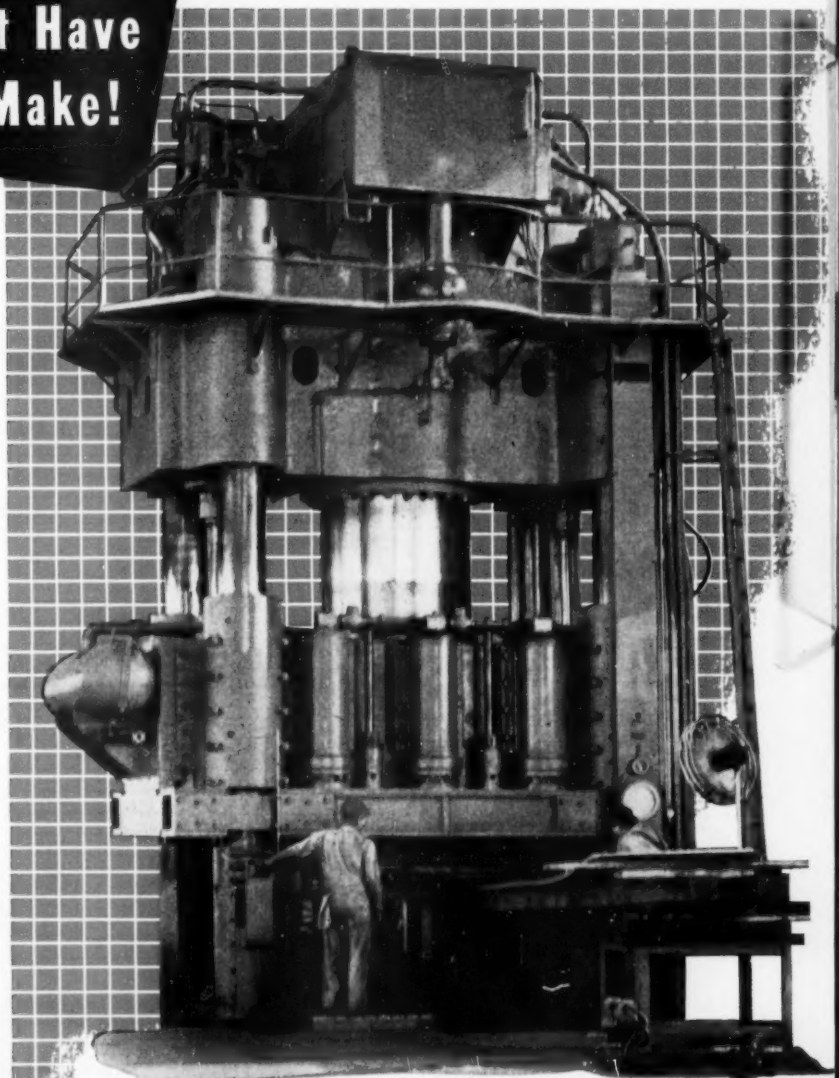

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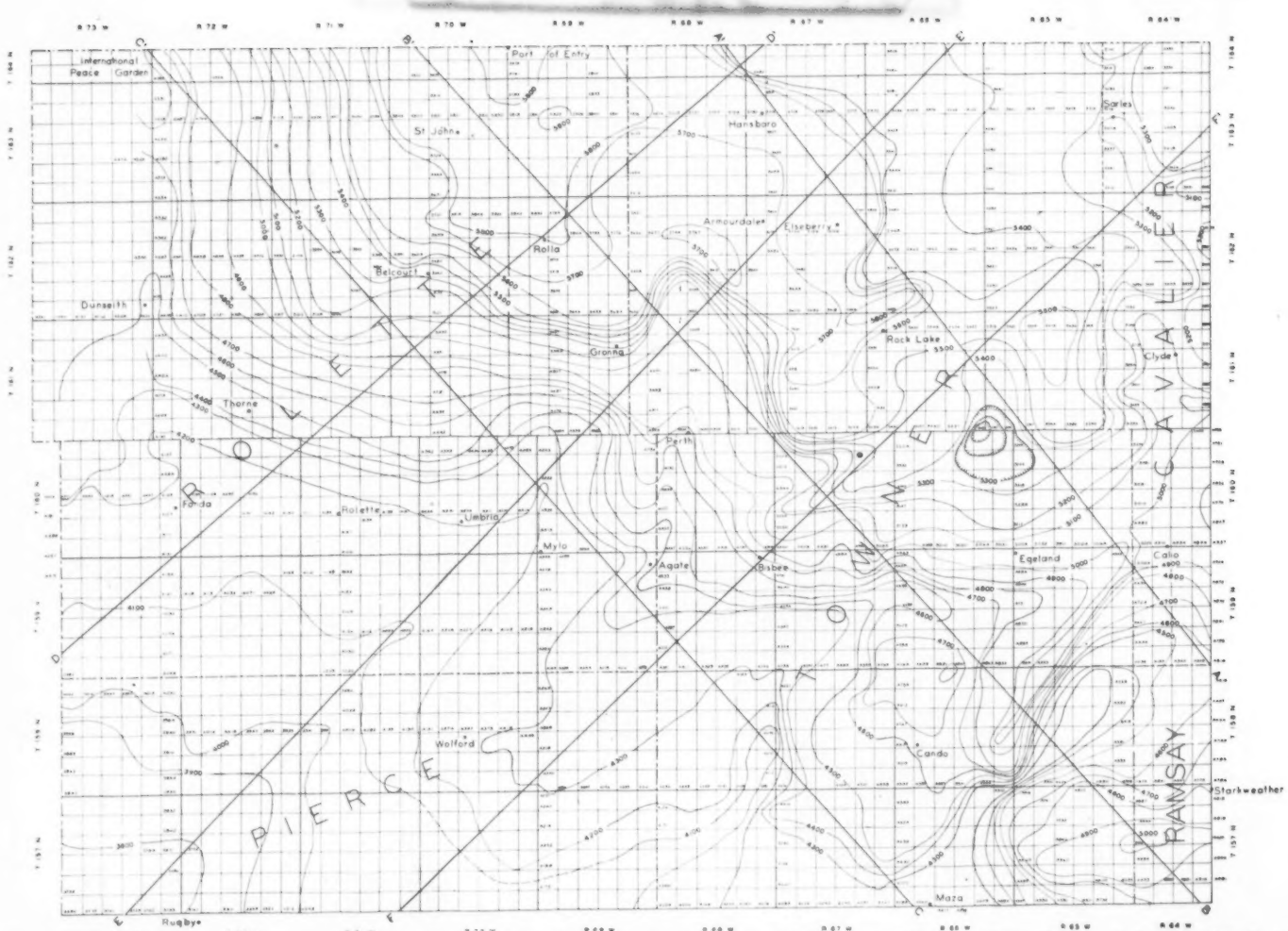


Fig. 1—Magnetic map of Rolette and Towner counties, North Dakota. Isogam lines are drawn at 100-gamma intervals. (From Report of Investigation 6, North Dakota Geological Survey, Wilson M. Laird, State Geologist.)

Geomagnetic Survey in Williston Basin...

Rolette and Towner Counties, North Dakota

by N. N. Kohanowski*

AT the instigation of Dr. Wilson M. Laird, a geomagnetic survey was undertaken with the view of obtaining a general idea of possible subsurface structures in the area worked. Any such information, if determinable, was judged to be of help in the present search for petroleum. Work was begun near the end of June 1951 and continued until the end of August.

Area Surveyed

This survey completely covered Rolette and Towner counties and the adjacent parts of Pierce, Ramsey, and Cavalier counties. The area is limited on the north by the international border with Canada, while the southern limit runs east-west through the town of Rugby. On the east, the limit is a north-south line through the town of Starkweather, and on the west the line between Rolette and Bottineau counties and its prolongation into Pierce County. (See Fig. 1.)

Altogether, upward of 1,300,000 acres were thus reconnoitered. Wherever possible, traversing was along township lines with readings every mile. Where such stations could not be made, traverse lines had to be shifted 1 mile one way or the other. In general, however, the same number of stations per township was maintained.

Topography and Surface Geology

The area is covered with glacial till of Pleistocene age. Thickness of this till is known imperfectly, but probably ranges between 100 and 400 ft. At no point were there found exposures of underlying rocks.

Topographical relief is low with the exception of the Turtle Mountains, located in the northwestern part of the area studied, which rise about 200 to 250 ft. above the plain on their southern periphery. Lakes

*Assistant state geologist North Dakota Geological Survey.

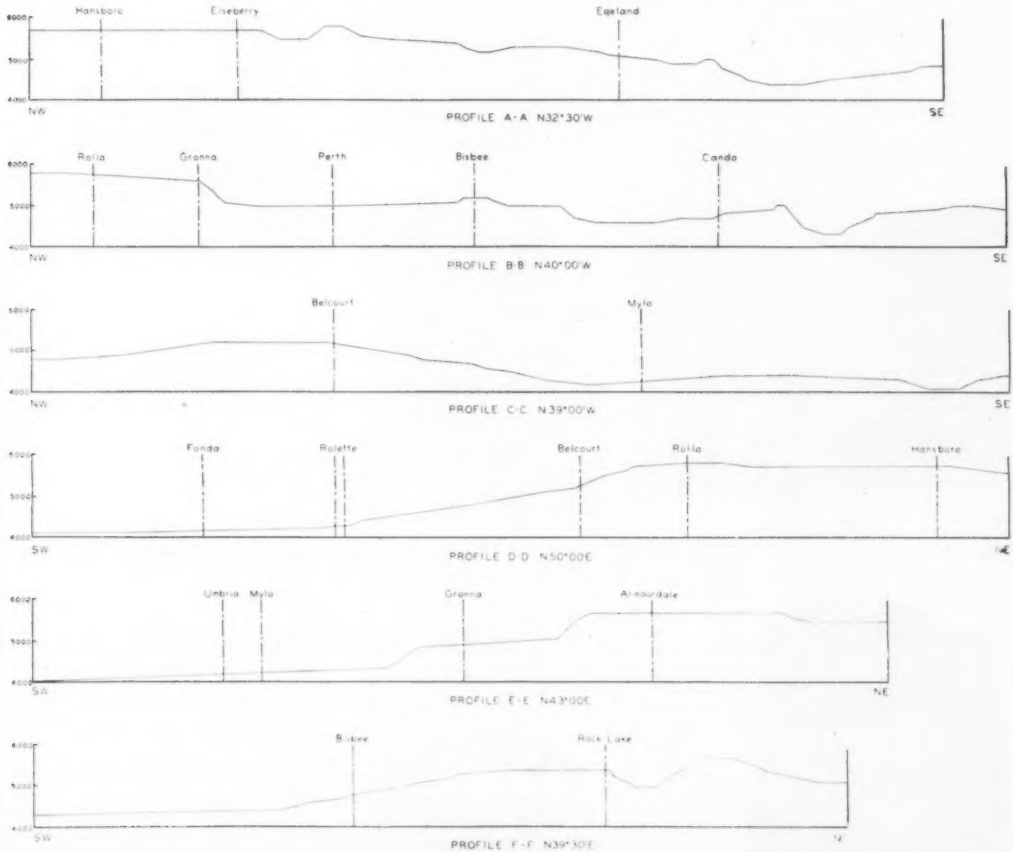


Fig. 2—Magnetic profiles of Rolette and Towner counties showing fluctuations in the vertical component of magnetic intensity. (From Report of Investigation 6, North Dakota Geological Survey.)

are particularly numerous on the Turtle Mountains. Generally speaking, lakes are most abundant in the northern half of the area surveyed. There are few permanent streams, but intermittent streams and lakes are numerous.

Results of Survey

As a result of this work a geomagnetic map of the area was prepared. The topographic scale is 2 miles to the inch. Isogam lines, showing variations in vertical component of magnetic intensity, are drawn at 100—gamma intervals. It was thought useful to make several profiles to show the fluctuations in the vertical component of magnetic intensity. (See Fig. 2.)

Several conclusions may be reached from a study of this map.

1. There is a definite geomagnetic gradient to the southwest, which may be interpreted as a gradual thickening of sedimentary strata in that direction.

2. An inference may be made as to the structure of the Turtle Mountains in the northwestern corner of the map. A fairly uniform spacing of isogammas indicated dynamically undistorted sediments, i.e. "no structure" in the general sense of that word. These isogammas do have comparatively high values, but such values must be attributed to the geomagnetic gradient and not to any folding, faulting, or injections of extraneous material.

The second conclusion is supported by the results of a few shallow holes drilled there by the Ground Water Division of the United States Geological Survey in 1949. Those holes, located on the latitude of Rolla, showed excessive thickness of glacial till on top of Pierre shale.

The picture changes between Belcourt and Mylo. There is a sudden widening of isogamma intervals and a consistent drop in values. This is due to a low magnetic susceptibility of deposits by the glacial lake Mylo that existed there at one time. This lake was outlined on surface in an unpublished report written by the author in 1949. Its deposits cover at least 12 sq. miles southwest of Mylo.

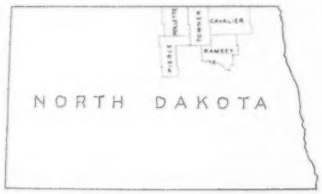


Fig. 3—Sketch map showing location of Rolette and Turner counties.

A large magnetic anomaly is evident between Perth and Hansboro. Isogamma configurations suggest an eroded asymmetric anticline. The magnetometer alone, however, cannot decide this question.

Finally, in the triangle with vertices at Egeland, Cando, and Starkweather another anomaly is apparent. It might be due to an escarpment or a deeply eroded valley under a covering of glacial till. Results of drilling farther east in Ramsey County suggest that this anomaly may be due to an escarpment.

No attempt has been made to estimate likely thicknesses to "bedrock." While such methods were devised in the past, their practical value is very questionable.

Instrumentation

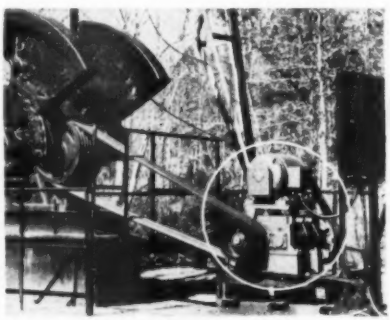
The instrument used for this survey was a Schimdt type vertical intensity magnetometer, No. 1063, manufactured by Spregnether & Co. This instrument did not have the precision of instruments ordinarily employed in commercial work, but has served well the purpose for which it was intended. Calibration of this instrument has shown that within the temperatures experienced, temperature corrections would be negligible; therefore, no such corrections have been made.

The instrument was adjusted to a fairly large scale value, which explains omission of temperature corrections. This scale value was maintained during the survey at between 86 and 91 gammas per scale division. Scale value adjustments were made by either Helmholts coil or auxiliary magnet methods.

Latitude and longitude corrections were made in the following way: The instrument was first adjusted for the latitude of Cando, which was almost in the central location. Additional corrections were made by subtracting 10 gammas per mile if the survey advanced northward and by adding a similar amount if the traverse was carried southward. Longitudinal correction consisted of adding 3 gammas per mile in a westerly direction and subtracting the same amount from easterly traverses. Rechecking of the instrument in Rolla indicated that such corrections were sufficient.

Diurnal variations, as a rule very large, were corrected by frequent checks on bases and subbases. Such checks had to be made at intervals ranging from 2 hours to 20 minutes, the interval depending on atmospheric conditions. Magnetic storms necessitated frequent interruptions of work and reworking of certain stretches. In one case, a jump in response of over 1,200 gammas was recorded.

As a further precaution against errors, all calculations were made from day to day. Thus, any unusual record could be checked and corrected.



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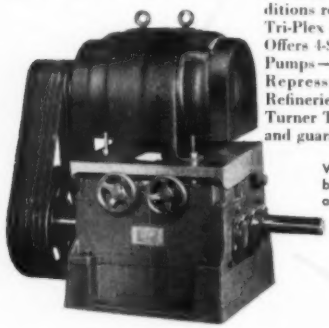

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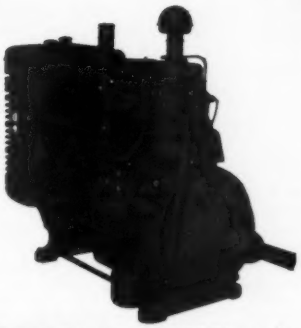

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POWER THAT PAYS

How to Interpret the Results of DRILL-STEM TESTS

by M. F. Manville* and O. W. Ward*

Valuable information is obtained on production, reservoir dynamic qualities, and P.V.T. relations

THE essential steps in the interpretation of drill-stem tests, with reference to the evaluation of a reservoir, are: accurate recording of surface pressure; detailed record of fluid recovery; interpretation of pressure charts; and comparison of these results with core analysis data, logs, and other subsurface data.

The information on the fluid recovery on a test is, of course, of prime importance. Amount and nature of recovered fluids should be inspected and recorded very accurately. Samples should be caught and saved for further analysis in case there is any question about the presence of water.

Available Information

A great deal of information becomes available on proper interpretation of drill-stem-test results. This may be summarized as follows:

1. The determination of whether a formation will produce oil, gas, or water and to locate the depth of the gas-oil contact and the water-oil contact.

2. Additional material is available for the reservoir engineer through the use of a subsurface sampling device run in conjunction with the testing tool. A representative bottom-hole sample is trapped at static reservoir pressure, and is retrieved along with the test tool.

This sample is then available for analysis which will give pressure-volume-temperature (P.V.T.) data needed for reservoir calculations. When a complete analysis for P.V.T. data is not needed, a less-detailed analysis may be made to determine solution or bubble-point pressure, gas-oil ratio, and other data on residual oil.

3. An indication of rate of production can be determined from the volume of fluid recovered during the time the test tool was open. When a well flows on a drill-stem test, the rates of flow can be measured at the surface. The term "indication of rate" has been used above since it is seldom possible, at the time of well completion, to duplicate the conditions existing during the drill-stem test.

4. The dynamic qualities of the reservoir such as the flowing pressure and shut-in pressure can be recorded. The bottom-hole pressures recorded during a test have so increased in importance that often the prime reason for testing is to obtain accurate pressure measurements, particularly where fluid recovery is small.

5. Measurement of hydrostatic pressure exerted by the fluid in the hole can be made. This is of primary importance in wildcat wells.

By noting the maximum formation pressure, as compared to the hydrostatic pressure, the margin of safety with respect to blowouts is known.

The mud pressure at the bottom of the hole also gives a check on the actual average density of the mud.

6. Formations suspected of taking mud can be tested. Normally when lost circulation occurs, it is assumed that the zone being penetrated is the zone taking the fluid. Experience has shown this assumption to be frequently in error, as in the case of increasing mud while drilling, a formation previously penetrated may break down.

Drill-stem tests are frequently run after circulation is reestablished, to test the bottom zone. Zones which have been taking mud will release large volumes of mud, thus indicating whether this was the formation in which circulation was lost.

7. The presence of excessive wall cake or heaving formations can be readily spotted while running in the hole. These conditions are usually shown by the weight indicator, and are recorded on the pressure chart. In this respect, the condition of the hole and character of the mud are principal factors contributing to a successful test.

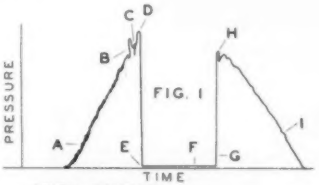
The modern pressure recorder provides a graphic record, in terms of pressure and time, of each event in connection with a drill-stem test, from the time the tool leaves the surface until it is retrieved.

This pressure record, when correlated with all the other data, such as surface blow and fluid recovery, provides essential information regarding the commercial possibilities of the tested zone.

Chart Interpretation

To illustrate the information available through proper interpretation of pressure charts, several have been selected from tests made in Kansas, Oklahoma, and Texas, and are used here as typical examples.

Loose sand.—As the test tool is lowered in the hole, as at A in Fig. 1, the chart indicates a relative increase in pressure and time. The broadness of the line results from agitating the pressure recorder when picking up the pipe to pull the slips, and again jarring the string when setting the slips.



STATE: KANSAS
INTERVAL TESTED 3,465-78FT
OPEN 30 MINUTES
SHUT IN 15 MINUTES
RECOVERED 30 FT OIL AND GAS-CUT MUD

Each jolt, or sudden change in running speed is recorded. In this particular test, the agitation was not severe, but was fast enough to blur the line, which is normal for going in the hole.

At point B there is a particularly erratic line, indicating some difficulty in getting the packer down. This shows that the hole was in bad condition at this point.

Point C shows an almost constant pressure while the surface control valves were connected. This is the initial mud pressure, that is, the hydrostatic pressure of the drilling fluid at the bottom of the hole.

The high pressure at point D was the squeeze effect of setting the packer. As the packer is set, the rubber element is expanding against the walls of the hole, and as weight is applied to insure a good pressure seal, the mud under the packer cannot bypass. Thus the squeeze results

When the tool is opened, the formation below the packer is exposed to atmospheric pressure. Should a water cushion be used, the formation is opened to a predetermined pressure above atmospheric.

For this chart (Fig. 1), there was no water cushion, and when the tool was opened, the pressure dropped to a very low figure, at point E. This was the initial flowing bottom-hole pressure. This tool was open 30 minutes, and during this time there was

*Johnston Testers, Inc., Houston. Presented at the spring Mid-Continent district meeting A.P.I. Division of Production, Wichita, Kans., March 19-21.

no pressure buildup which means that no fluid entered the tool after the initial surge due to fluid expansion. Since the back pressure against the formation was reduced to almost atmospheric, it must be assumed that the formation is dry, due either to lack of permeability or pressure. Substantuating this is the fact that on this test the valve in the testing tool was closed at point F during the last 15 minutes of the test period, during which no pressure buildup resulted.

The tool was pulled loose at point G, allowing the drilling fluid to again cover the formation and the "final mud weight" was recorded at point H.

The testing tool was pulled from the hole at point I, and it should be noted that the trouble at point B, while going in the hole, did not record on the trip out.

The fluid recovery on this test was 20 ft. of drilling fluid.

Tight formations.—Fig. 2 also shows a zone which had no pressure buildup during the flow period, but had a pressure buildup when the tool was shut in. This type of chart is rather common for tests in limestone, or very tight sand.

An understanding of the test conditions will explain the reason for the shut-in pressure, when the flow pressure is zero. When the tool was opened to permit this type formation to produce, only the drilling fluid, with a little oil and gas, rose into the pipe. This was partially due to the expansion of air and gas in solution with the mud at bottom-hole temperature and hydrostatic pressure, and the remainder was due to expansion of the formation fluid around the well bore. For the remainder of the open time, fluid entrance was very slow.

When the shut-in valve was closed all of the space below the valve was filled with fluid. Thereafter, the small volume of fluid entering the well bore was sufficient to increase the pressure, and in a very short time the pressure reached equilibrium, and the static pressure of the formation was recorded.

Fig. 3 also shows a test on a zone with very low permeability. When the tool was opened, there was a very weak blow at the surface which decreased to zero in a very short time. There was no surface blow during the next 25 minutes, and the equalizing valve in the tool was operated, in hope of removing any plug that might exist.

The resulting temporary increase in back pressure on the formation is shown at point A. The tool was immediately reopened, and the pressure decreased to the hydrostatic weight of the small amount of fluid which had formerly entered the tool. Of particular interest on this chart is the pressure buildup curve during the 15-minute shut in. At the end of the shut-in period, the pressure was not yet leveled off, which is further indication of very low permeability.

Plugging.—Fig. 4 is a chart from a test where plugging occurred. Considerable difficulty was encountered in running the tool in the hole. In working the tool through tight spots, swabbing action was recorded. This can usually be attributed to improper mud control.

When the tool was opened, the viscous mud, wall cake, cavings, etc, which had been scraped off the wall and pushed ahead of the packer, immediately entered and plugged the tool. As the pressure from the formation built up sufficiently to move this viscous material, the pressure dropped temporarily until plugging occurred again.

This process was repeated to point A, where the tool plugged and remained plugged to point B. At point B, the pipe was moved to operate the shut-in valve, and caused a temporary unplugging at point C. The shut-in pressure buildup was then normally recorded.

It may be assumed the minimum pressure indicated during the flow period was the initial flow pressure. However, the tool did not remain open long enough to give a flowing gradient, and the only valuable information gained from this test was the shut-in pressure, and the fact that a trace of oil and no water was recovered.

Fig. 5 was a flowing test. The tool was open 1 hour and 30 minutes. Note the smooth curve from points A to B. This was the flowing pressure buildup curve, and during the last part of the flow period, the flowing pressure had stabilized.

Experience has shown that the flow pressure often will decrease. The maximum flowing pressure is recorded when the column of fluid in the drill pipe (test string) has its greatest hydrostatic weight. This is just at the time the fluid reaches the surface, and the drilling mud from below the packer is being unloaded. From this point on, the back pressure against the formation (bottom-hole flowing pressure) will decrease. This is a reflection of the fluid pressure gradient in the drill pipe as the well cleans up and approaches a stable production rate.

The term "indication of permeability" in the foregoing discussion has been used. Good initial flow pressures indicate good porosity and/or permeability in the immediate area of the bore hole. Rapid buildup in flow pressure indicates good permeability further back in the formation.[1]

Acknowledgments

The authors wish to express their appreciation to Miss Eleanor Torpey and Ted Anderson, J. E. Smith, J. J. Arps, J. E. Dear and W. B. Taylor for their suggestions and assistance.

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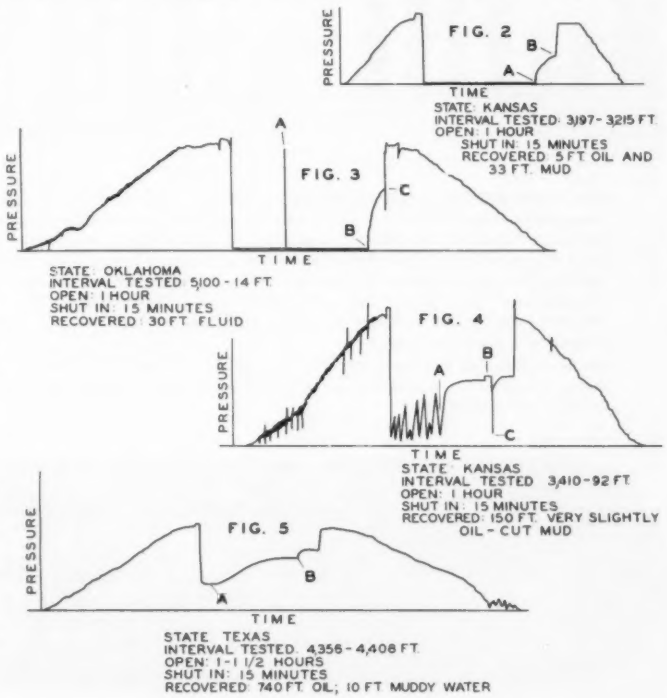

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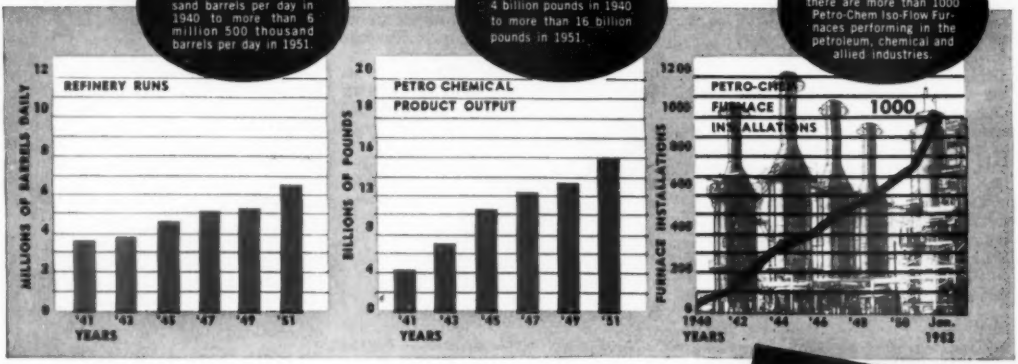

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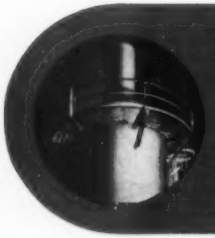

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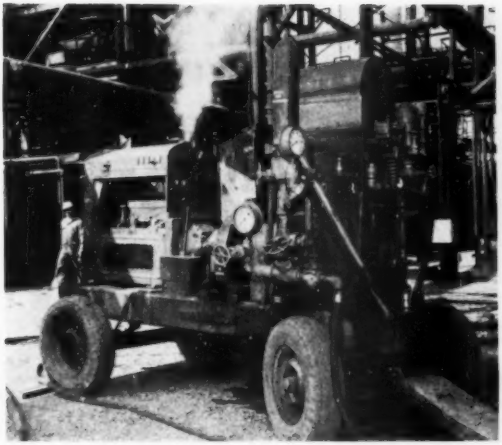

Fig. 1—Triplex power pump develops 1,000 psig. pressure.

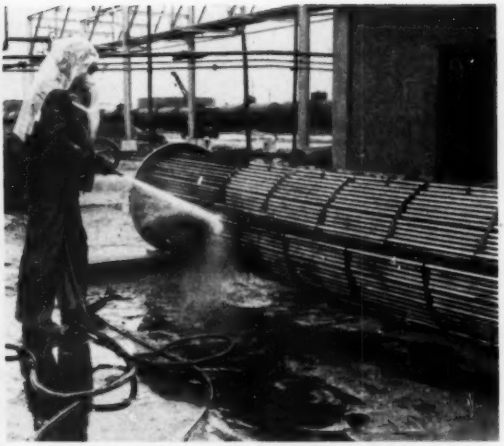

Fig. 3—Hydro-Silica gun used in cleaning tubular goods.

How Shell Oil Uses

High-Pressure Water in Maintenance, Construction

THE use of high-pressure water in Shell Oil Co. refinery operations dates back to the hydraulic decoking of coke chambers; however, the potentialities of this medium for maintenance cleaning were not realized until considerably later. Portable equipment has now brought high-pressure water to all areas of the refinery, and use of this medium has been greatly extended.

It has been estimated by Shell Oil Co. engineers that cleaning costs in Shell refineries amounted to over 1 million dollars in 1947. Due to expanded operations, this figure would be far greater at present if improved cleaning methods had not been developed at all locations.

Every effort is being made at the Wood River refinery to reduce cleaning costs by the expanded use of chemicals, sand and grit blasting, and high-pressure water. To expedite the development of equipment and technique an industrial engineer has been assigned to this activity.

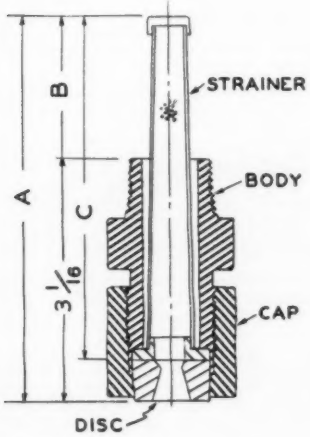

Fig. 2—(Left) Descaling nozzle which produces a fan-spray pattern from a slotted disk.

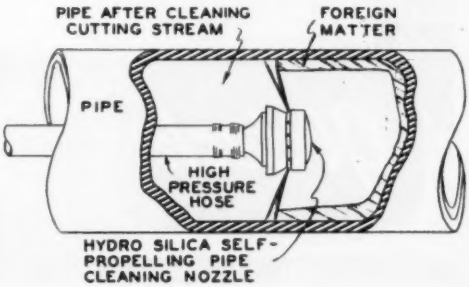

Fig. 4—(Right) Cutaway of pipe showing pipe-cleaning nozzle in operation.

REFINING POINTERS

by J. Vasey*

Availability

Two portable pumps are used to make high-pressure water available at desired points. A triplex power pump is shown in Fig. 1. This unit is driven by a gasoline engine and mounted on a rubber-tired trailer. This pump is rated at 67 g.p.m. at 950 psi. differential head.

A two-stage rotary pump, gasoline-engine driven and trailer mounted is also used. This pump is rated at 250 g.p.m. at 150 psi. differential head when operating with stages in parallel at 200 r.p.m. With the stages in series, the rating is 125 g.p.m. at 300 psi. differential head. Both pumps take suction from the fire line at 150 psi. pressure.

Use of the high-pressure pump is

*Engineer, Wood River, Ill., refinery, Shell Oil Co.

scheduled through the planning engineer. It is in use 60 per cent of the time on day shifts and 30 per cent on 4-12 shifts. Frequently, the equipment is required on several jobs. Priorities are then assigned and jobs deferred as long as possible in order to utilize this equipment.

Shop inspections of both pumps are made weekly. This includes adjustments to the regulating valve and packing and oil change as required. Bearings and internals are inspected at longer intervals. The pumps are used by all crafts and, while on the job, the foreman is responsible for maintaining lubrication, packing adjustment, and minor repairs.

A permanent wash rack located near the east end of the plant is supplied with water from the cracking department decoking pumps at approximately 1,000-psi. pressure.

Nozzle Types

Various nozzles are used with this cleaning equipment depending on the type of cleaning to be done.

Descaling.—A Worthington descaling nozzle is shown in Fig. 2. It produces a fan-spray pattern from a slotted disk and is designed to deliver 34 g.p.m. at 1,000 psi. This nozzle is used primarily to remove soft to medium-hard scale from the outside of tubulars such as on overhead condensers and lube-oil coolers.

A straight nozzle of the round orifice decoking type is used for cleaning the interior and exterior of small tubes when scale deposits are relatively hard and a large volume of water is required. Generally, it is used on heat exchangers where temperatures are moderately high.

A four-nozzle head is used on square-pitch tube bundles when relatively soft water or hydrocarbon deposits are present. The cleaning speed with this nozzle is great and it is used whenever possible to clean the inside of tubes. Both the four-nozzle and the single-nozzle heads were refinery designed and fabricated.

Pipe cleaning.—A Hydro-Silica gun nozzle is used for pipe cleaning as shown in Fig. 3. This nozzle is fitted with an aspirating connection through which air is drawn to mix with the water system in a ratio of 1 part air to 10 parts water. It appears that aeration improves the quality of cleaning. When hard water or hydrocarbon scales are to be removed, sand or other abrasives are drawn at variable rates into the nozzle with the air stream.

The gun is supplied with orifices to furnish 7½, 10, and 15 g.p.m. The relatively small discharge produces a small reaction effect and permits one-man operation. The Hydro-Silica gun is used for cleaning the external surfaces of tube bundles, tower trays, and internal surfaces of vessels of various types.

A self-propelling nozzle is shown in Fig. 4. The multiple jets are inclined backward to pull long lengths of water-supply hose through pipes or tubes as the cleaning progresses. This type of nozzle was employed in cleaning a 300-ft. section of 8-in. sewer which was inoperative because of heavy lime deposits. A 3 per cent solution of hydrocholoric acid was pumped at 2,000 psi. to the nozzle which propelled itself and the ½-in. supply hose over 150 ft. from each of two manways.

Boring nozzles.—Two types of nozzles are employed for underground boring in the installation of casings under roads, railroad tracks and firewalls.

The boring nozzle, illustrated in Fig. 5, is fixed in the forward end of

Fig. 5—Underground boring nozzle is attached to casing. High-pressure water bores directly through soil.

the casing being installed. Several streams of high-pressure water are directed forward to enter into the soil while others are directed to the

(Continued on page 139)

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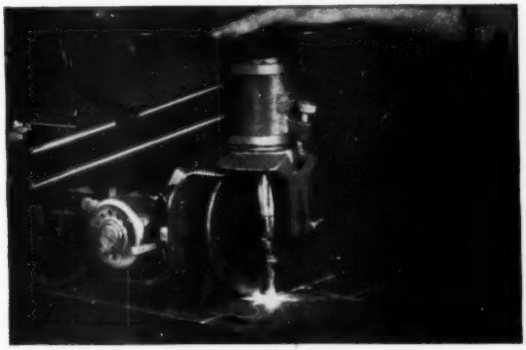

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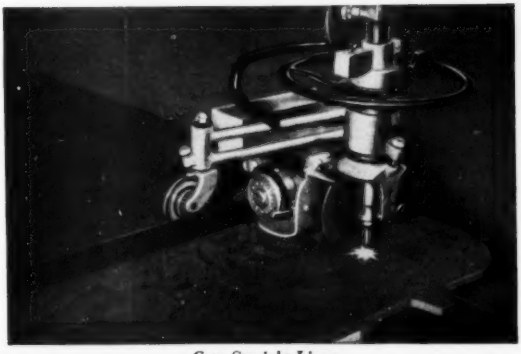
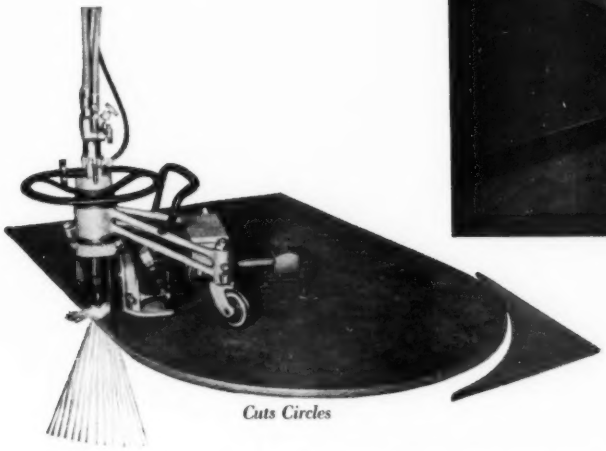


Cuts Straight Lines



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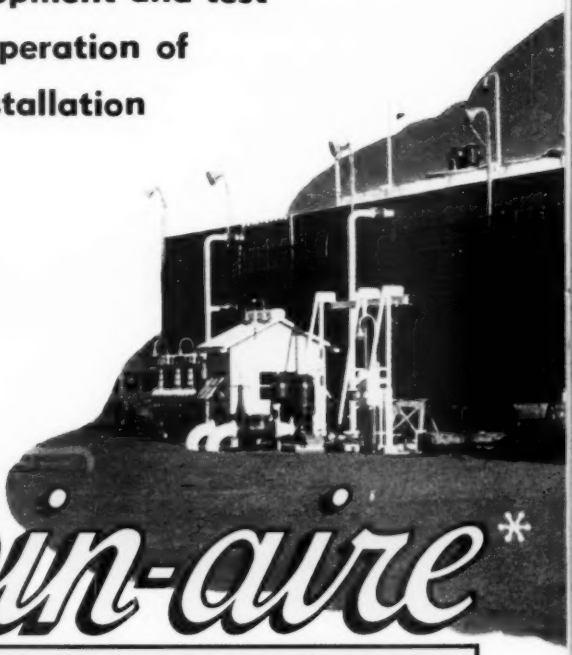

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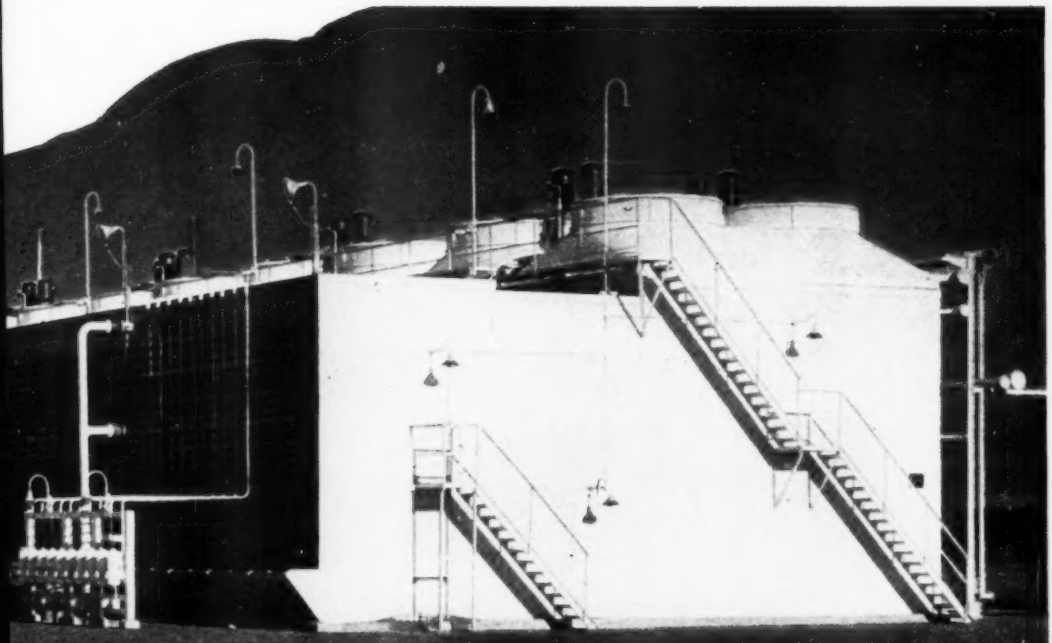

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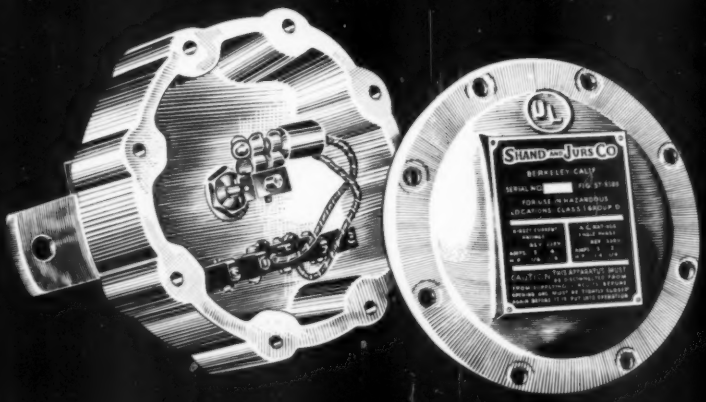

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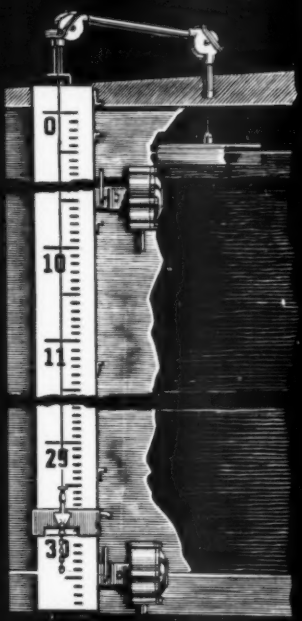

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rear to wash cuttings out of the pipe. Force is applied to the exposed end of the casing to push it forward as cutting progresses.

The second type of boring nozzle is used where direct water boring through the soil is not permissible, as when making a crossing under a railroad right-of-way. The pipe is pushed forward by means of hydraulic jacks while backward-inclined jets on the nozzle impinge on the pipe near the forward end and wash out the cuttings.

Both types of boring nozzles and procedures followed were developed by refinery personnel.

The hazard of using high-pressure water is recognized and safety devices and precautions are used as shown below. The foreman and the men are being continually educated regarding the dangers of handling the water at high pressures. It is realized by all that a person could be killed instantly if struck with the water at close range.

1. Protective clothing is worn.
2. When the nozzle man is not within sight of the pump operator, a sound-powered telephone is used to convey his instructions. When the telephone is not available, signal men are employed.
3. The cleaning area is isolated by rope.
4. Additional safety equipment is now being studied.

Quotations have been received on a "dead-man" type shutoff valve which appears satisfactory except that it does not provide a firm grip for the nozzle man. This valve, with possible revisions, is being considered.

Another safety device has been designed which consists of a diaphragm control valve from discharge to suction of the pump. Opening and closing are accomplished with a pilot line from the nozzle. If response could be made instantaneously, this arrangement would eliminate the need for the dead-man valve and also accomplish complete control of flow by the nozzle man.

The use of high-pressure water has substantially reduced cleaning pipe-installation costs. The following are examples:

1. At two alkylation plants, where some 40 tube bundles are cleaned twice annually, costs have been reduced by approximately $1,000 per year. Annual savings of over $500 have been accomplished in bundle cleaning at a catalytic desulfurization unit. Proportionate savings have been realized on all operating units where deposits range from soft to medium hard.

One experience has been that when cleaning the inside of tubes an average of 35-man-seconds is required with high pressure water as compared to 75 man-seconds when using a conventional turbining tool.

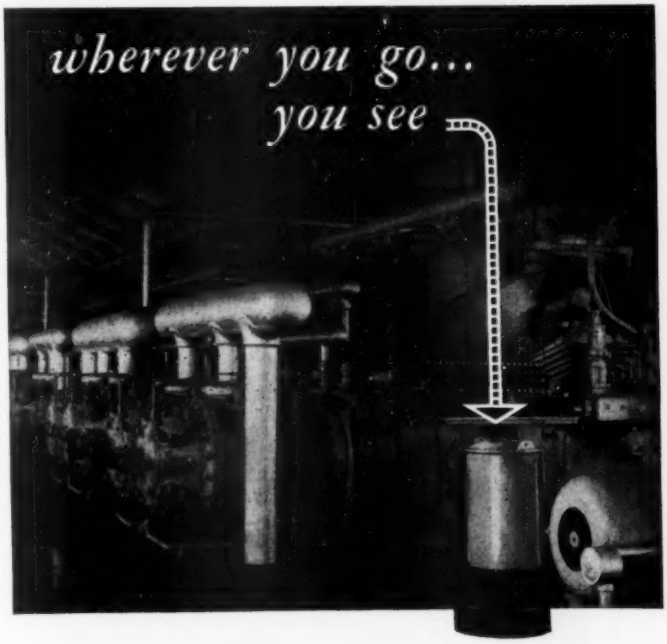
2. Using the 7-g.p.m. Hydro-Silica gun, the trays of a distillation column were cleaned with a reduction in labor of approximately 40 man-days, as compared to the former procedure where the bubble caps were removed and the trays cleaned by hand.

3. During a shutdown at the vacuum plant, the stills were cleaned using high-pressure water. Labor savings over hand methods were about $3,000 and the job quality was improved.

4. Water-boring operations for under-road crossings also show substantial savings. Recently 140 linear feet of 24-in. pipe was installed under the railroad right-of-way and the job was accomplished by pushing the pipe forward with jacks and washing the dirt out with high-pressure water. Job cost was about $2,200. It is estimated that if conventional hand-boring and digging methods were used the cost would have exceeded $3,200. Contractor price quoted was $4,000.

5. During a shutdown of a distilling unit, the Hydro-Silica gun was used to remove a portion of the ganister lining from one of the desalters. Normal scraping methods would have required extensive scaffolding but, since the gun can be operated from a seat board, the saving of 24 man-days of carpenter time was realized.

High-pressure water has also been used for cleaning sewer lines, pipe trenches, and concrete pads. It is likely that additional applications will develop.



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Successful Water Flooding . . . *and factors that affect it*

by W. W. Wilson,* C. L. Brown,* and K. D. Sheppard*

Evaluation of information normally available should "enable the average operator to screen out water-flood prospects with limited opportunity for profitable operations." The authors' criteria are applied to data obtained from formation characteristics, reservoir information, and field production history. The procedure is not detailed or time-consuming when simplified methods for estimating reserves and optimum oil production are used.

EXPERIENCE has shown that water flooding cannot be applied with equal success to all reservoirs. This fact is of considerable economic importance because the margin between a reasonable profit and a substantial loss is smaller in water flooding than in most primary operations. This risk factor is largely responsible for the vast amount of study and research directed toward the development of more reliable criteria for predicting flood performance.

In making an evaluation of a specific flooding prospect, it is suggested that an investigation be made to determine the possible effect on the project of each of the factors here discussed. The presence of one or more favorable conditions is no assurance of successful flooding.

Similarly, the presence of one or more unfavorable conditions should not necessarily condemn the prospect, but may indicate the need for a more thorough analysis or the desirability of a pilot flood. Some unfavorable conditions are subject to corrective practices or remedial work, usually at considerable expense.

The Factors

Primary depletion mechanism.—Solution-gas-drive reservoirs offer the best possibilities for water-flooding operations because of their favorable relative permeability and oil-saturation conditions after primary depletion.

Water-drive reservoirs are generally unsuited to subsequent water flooding since water saturations are high and oil saturations are low at the end of the primary phase. Occasionally, however, a natural water drive may affect only a small portion of the reservoir; and if this depleted section can be isolated, the remainder may be flooded successfully.

Both gravity-drainage and gas-cap-expansion reservoirs are unsatisfactory flooding prospects because of the mechanical difficulties involved in packing off the upper barren sections and the danger of vertical fluid movement.

Residual oil saturation.—Successful water flooding cannot be expected if any major portion of the section to be flooded has an oil saturation less than about 35 per cent of the pore volume.[1,2] Such semibarren zones usually possess high relative permeability to water, and cause serious bypassing or channeling of injected water.

Average oil-saturation values for entire reservoirs are generally without significance, since the oil saturation of the more permeable zones may be much lower than the average value. If extensive coring cannot be utilized, however, a calculated value of present average oil saturation might indicate whether bypassing difficulties could be anticipated.

Average oil-saturation values may be calculated with reasonable accuracy by the following equation:

$$S_o = 1 - S_w - \frac{P\beta}{\beta_o} \Big/ \frac{}{7758 \times \phi \times A \times h},$$

where

S_o = Present oil saturation, as a decimal fraction of pore volume
S_w = Water saturation, as a decimal fraction of pore volume
β_o = Formation volume factor, initial[11]
β = Formation volume factor, present
P = Cumulative oil production, bbl.
ϕ = Average porosity, as a decimal fraction
A = Area to be flooded, acres
h = Average sand thickness, ft.

Connate-water content.—Connate-water saturation is important in that it affects the relative permeability of the sand and indirectly determines the initial oil saturation of the reservoir. Sands with connate-water saturations in the order of 35 to 40 per cent have been flooded successfully, but it is doubtful that a successful flood will result when the water saturation exceeds 45 per cent.[2]

Laboratory tests indicate that as long as the water saturation is below the critical range better flooding efficiencies are obtained in formations with high water saturations.[3]

Water-production history.—Previous water production is one of the most important factors to investigate before initiating a water flood. Any reservoir with a history of water production should be looked upon with suspicion in evaluating water-flooding possibilities.

Many solution-gas-drive reservoirs produce small quantities of connate water during primary depletion and this may be no cause for alarm, but if there is evidence of production from a water-bearing zone in the reservoir it will be necessary to isolate this section in all injection wells to prevent channeling and the loss of an appreciable portion of the injected water. Such channeling would result in high water-oil-ratio production very early in the life of the flood, creating an acute pumping problem and reducing the ultimate oil recovery.

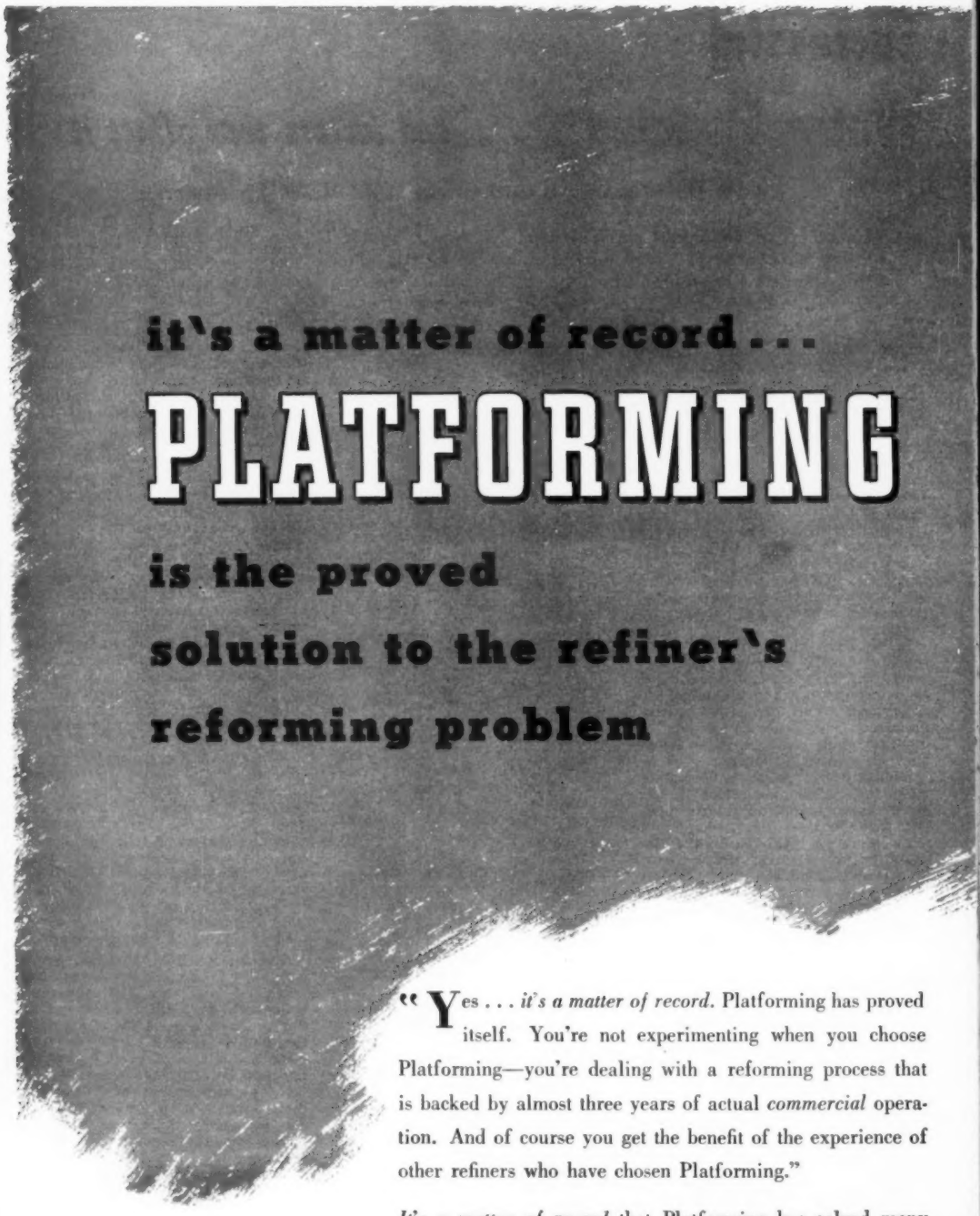
Another common difficulty with reservoirs which produce water is the danger that one or more old wells may have been temporarily abandoned for extensive periods. Water standing in these wells may have built up sufficient head to backflow into the water-free portions of the reservoir, causing extensive damage.

Structural relief.—Moderate structural relief usually has very little effect on water-flooding operations. Reservoirs with little structural relief are desirable if the flood is of the pattern type in order to minimize the effects of gravity segregation and vertical fluid movement.

If a reservoir has a dip greater than about 10°, a peripheral flood may possess the advantage of greater control of fluid movement, but this may be less important than the disadvantage of the longer time required to complete the operation as compared with a pattern flood.

Lenticularity.—A moderate amount of lenticularity in the pay formation probably is conducive to successful flooding operations because relatively continuous shale layers or impermeable streaks will tend to restrict the

*Continental Oil Co., Ponca City, Okla. Presented at meeting of the Mid-Continent District A.P.I. Division of Production, Wichita, March 1952.



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fluids to horizontal movement. Excessive lenticularity, however, will result in substantial trapping or bypassing of otherwise recoverable oil.

Critical study of well logs and isopachous maps will usually yield a fair picture of the lenticularity of the reservoir. The degree of lenticularity will of course affect well spacing in a pattern flood. This resolves itself into a balance between the value of additional oil to be gained by close spacing and the greater cost of denser drilling.

Type of porosity.—Sandstones and granular or oolitic limestones comprise the vast majority of formations which have been flooded successfully. Very little information is available in the literature concerning the applicability of water flooding to fracture-type porosity.

It is apparent that many fractured reservoirs could be poor flooding prospects because of the tendency of the injected water to move through the larger openings leaving large quantities of oil in the smaller fractures and matrix pores. The preceding comments are not meant to imply, however, that no attempts should be made to flood fractured limestone reservoirs since experience with this type of reservoir is largely lacking.

Permeability distribution.—A reservoir in which all of the productive zones were of the same horizontal permeability value would be ideal for water flooding since all of the zones would be flooded out at the same time. This condition never occurs in nature, but the closer this optimum is approached the more successful the flood will be.

Extremely erratic permeability profiles generally result in prolonged periods of high water-oil-ratio production followed by abandonment before all of the sand has been flooded. Selective shooting,[4] multiple packer installations, and selective plugging[5] may somewhat compensate for erratic permeability distribution, but these measures generally are only partially effective and will increase development or operating costs.

Unfortunately, there is no satisfactory way of determining in advance of flooding the lower limit of permeability (in a distribution curve) which will be flooded effectively. There is evidence that in some reservoirs the permeability varies in such a way as to average out the distribution between wells and equalize water movement throughout a major portion of this section.[6] Careful comparisons among core analyses may indicate whether this condition exists. It is probable, however, that the lateral gradation of permeability usually will not compensate completely for the heterogeneity of the profile.

Depth.—The depth of a reservoir has a direct bearing upon the maximum sand-face pressure which can be applied to inject water without

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rupturing the formation. Depending upon the area and type of formation, the rupturing pressure varies between about 0.5 and 1.5 psi. per foot of depth. A consequence of this relationship is that shallow, tight sands often are economically impracticable to flood.

Deep sands, on the other hand, can be flooded at high pressures which may result in more rapid depletion and permit wider spacing. This influence upon spacing, especially when redrilling is required, renders depth an important economic factor. Optimum flooding depths usually range between 500 and 3,000 ft. for reservoirs having average sand conditions.

Oil viscosity.—Low reservoir-oil viscosity is favorable to the success of a flood because less energy and hence less water will be required to displace the oil.[7] Successful floods have been conducted in reservoirs containing oils having viscosities ranging up to about 30 cp.

Experience is lacking for floods of higher viscosity oil and no arbitrary upper limit beyond which flooding should not be considered can be stated. Several floods are now in progress in reservoirs where oil viscosities are measured in hundreds of centipoises, the results of which will add to our understanding of this subject in the near future.

In general, the lower the reservoir oil viscosity, the greater is the chance of a successful flood.

Emulsions.—Oils which tend to emulsify may present a difficult problem in water flooding. The treatment of large volumes of emulsion will add to operating costs. Fortunately, however, most emulsion-forming oils are relatively stable in the presence of water except within a critical range of percentage ratios.

At present, experience with this type of oil is too limited to predict with accuracy its effect upon water-flood performance.

Old wells.[8]—With the possible exception of relatively shallow, easily drilled formations, it is probable that the use of old wells will be necessary for the major part of a water-flood development.

Many reservoirs, physically adapted to secondary-recovery operations, cannot be flooded economically because of the excessive cost of drilling new wells or recompleting old wells which were plugged at the end of primary production. An economic balance frequently must be made between the cost of new wells with probable higher recovery and the use of old wells with probable lower recovery. The indicated choice is usually in favor of using the old wells wherever possible.

A serious dificulty often encountered when it is decided to use on old well for water-flood development is a lack of information concerning the original completion and current condition of the well. When this situation is general for a large number of wells it usually is desirable to start the development with a pilot flood, not only to gain information concerning the reaction of the reservoir to water, but also to determine whether extensive recompletion work will be required.

There are many sources of trouble in the use of an old well. If a well which has been shot be used for injection it may take water at rates above those which are required or desirable. Paraffin or asphalt deposits on the sand face, if not removed, may partially plug the exposed formation and seriously reduce injectivity rates. A common occurrence in some areas is incomplete penetration of the formation to be flooded.

One of the principal causes of unsatisfactory or uneconomic flooding operations is the presence in the exposed sections of the injection wells of barren zones which will channel large quantities of water to the producing wells with the resultant loss of energy and high water-oil-ratio production. These thief zones may be sections of original or secondary gas caps, or water-bearing sections which were not cased or plugged off during the original completion of the well.

The cost of recompleting such wells usually is high and may be sufficient

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to make it advisable to drill new wells. Another difficulty in connection with original well-completion practices is the possibility that portions of the sand face may have been contaminated with drilling mud or cement.

Improper well abandonments frequently are a cause of trouble in developing a water flood. This has been particularly true in some of the older fields where wells have been lost and their existence unknown until injection had started, with obvious results. Such improperly plugged wells may have permitted water to enter the formation for a prolonged period of time resulting in the loss of considerable quantities of otherwise recoverable oil.

Prior secondary recovery operations.—Many water-flooding prospects will be found that have been operated for varying periods with the use of vacuum, followed by gas or air injection, and possibly by "dump" water flooding. Any history of vacuum operation or gas injection should be studied with great care before the development of a water flood. In most cases neither is likely to have reduced the reservoir oil saturation to unfavorable ranges though this should be checked as accurately as possible. Either process, however, will have had a tendency to reduce the gravity and increase the viscosity of the oil remaining in the reservoir.

Dump water floods represent an unknown danger since their uncontrolled nature renders their extent and effects dificult to determine.

Water supply.—In many areas the lack of an adequate supply of suitable water is the principal difficulty in developing a water flood. The total volume of water needed to flood a reservoir to depletion usually ranges between 0.5 to 1.5 pore volumes, depending upon the type of operation and the degree of control which can be maintained.

Daily injection rates depend upon the reservoir characteristics and the applied pressure and may range between 2 and 50 bbl. per day per foot of flooded section. Some economy may be realized by recycling produced water, but the advantages of this operation may not be great if additional gathering and treating facilities are needed.

Field and laboratory evidence indicates that salt water is preferable to fresh waters for flooding some reservoirs because of unfavorable reactions of fresh water with interstitial clays. In many areas salt water is more easily obtained than fresh water, but the opposite is true in the Rocky Mountain area. In that area some reservoirs probably cannot be flooded successfully with fresh water and the problem of locating adequate volumes of brine is acute.

External power source.—In the usual case of flooding a reservoir which has been depleted by primary production, the quantity of gas which will be produced during the life of the flood will be much less than that required for the entire operation. Frequently, at the start of a flood, gas production will be in excess of lease requirements for a short period and the gas will be rich in natural-gas liquids.

During the later years of the flooding operation gas production usually is negligible, and the power requirements will be great because of increasing water-oil-ratio production. Additional sources of gas or electrical power then will be required to continue the flooding operation. Plans for developing those sources should be made concurrently with the flood-development program.

Lease and royalty problems.—The development of individual properties for water flooding would be simplified if it always were possible to drill injection wells on a cooperative basis along property lines. In most cases this is impossible, either because of economic considerations or because of restrictions which prevent drilling closer than some fixed distance from property lines.

As a result of this situation, some form of cooperative agreement or unitization usually is required to recover the oil in the undrilled areas along the common property lines. This frequently is a difficult problem,

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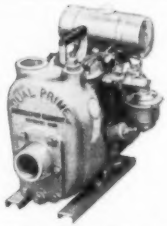

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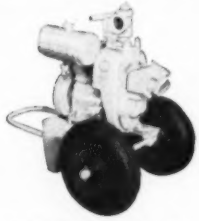

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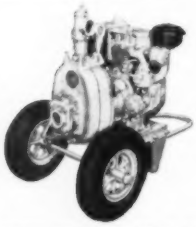

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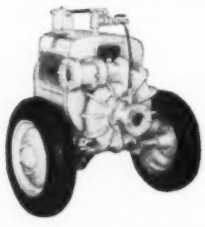

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because of the possibility of legal action by royalty owners claiming drainage. Where producing areas are divided into a large number of small tracts with diversified lease and royalty ownership the secondary-recovery possibilities are poor unless complete unitization can be achieved.

Reserve calculations.—In the economic analysis of a water flood the quantity of recoverable oil in the reservoir or underlying given acreage is of primary importance. While several methods have been proposed for determining this volume, one relatively simple procedure is to calculate the reserves based on the present oil saturation, an estimated oil saturation at abandonment and an efficiency or performance factor. With these factors the reserves recoverable by a water flood can be found by substituting in the following equation:

$$\text{Water flood reserves} = 7758 \times \text{A.F.} \times \phi \times \text{P.F.} \left(\frac{S_t}{\beta_t} - \frac{S_a}{\beta_a}\right)$$

where

A.F. = Net acre-feet
ϕ = Fractional porosity
S_t, S_a = Oil saturation at times "t" and abandonment
β_t, β_a = Formation volume factor at times "t" and abandonment
P.F. = Performance factor

The estimate of residual-oil saturation should be based on available data, such as flood-pot tests, electric-log calculations, or comparison with floods in similar sands. The range of values for the residual-oil saturation at abandonment of the flood is usually between 20 and 30% per cent, depending upon operating conditions.

The efficiency or performance factor takes into consideration the type of flood being used, well spacing, lensing or trapping losses, and permeability distribution. While this factor may vary widely, an average value of 50 to 70 per cent is generally reasonable.[9]

The above calculation, though extremely simplified, provides a rapid means of determining whether additional investigation is warranted. If the results of calculations such as these indicate the prospect to have good flooding possibilities, additional information should be obtained to confirm the calculations before a large sum of money is expended in a full-scale development. This may require a comprehensive coring program and/or the operation of a pilot flood in a representative area of the reservoir to determine reservoir behavior.

The economics of any water-flood project are closely related to the market price of the crude. Consequently, some future price predictions must be made in order to determine the quantity of money which might

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profitably be spent developing the field.

Production rate.—The oil-production rate of a water flood is dependent upon the injection rate, which in turn is controlled by the effective permeability of the zone and the permeability distribution, well spacing, applied pressure, and fluid viscosity. Where all these factors are known accurately, the oil-production rate may be calculated directly.

An approach to this problem has been made in the Bradford area, using detailed computations of the injection rate into each continuous streak of sand within a five-spot, where all wells are cored. This is an ideal situation which seldom, if ever, could be achieved in any other area.

A number of rule-of-thumb experience factors are useful for estimating future oil production rates, some of which are as follows:

1. The total volume of water which must be injected to flood a reservoir to depletion ranges between 0.5 and 1.5 times the total pore volume of the flooded area. The lower limit of 0.5 probably is applicable only to a few areas where flood control is exceptionally good; a range of 1.0 to 1.5 is reasonable for most operations.[10]

2. The total time to flood a reservoir can be calculated by dividing the total water requirements by the injection rate. Ordinarily this should not exceed 8 to 10 years for economic operation in the case of a pattern flood.

3. The first increase in oil production usually occurs after a volume of water equal to about two-thirds of the voided pore volume of the reservoir has been injected.

4. The total fluid production from a five-spot producing well will stabilize at about the average injection rate of the offsetting intake wells.

Development expense.—The principal cost of developing a water flood is for drilling new wells to complete a pattern or to develop an area previously not drilled. Considerable savings in this item can be made through a judicious economic balance of the cost of wells with profit to be gained from drilling these wells.

Such a careful analysis might rule out the drilling of wells to complete individual patterns near the edge of the reservoir or to develop previously undrilled areas where the recovery may be relatively low. Additional savings might be made through the use of the utmost economy in drilling and equipping any new wells that may be required, such as using small casing strings, injecting through the casing instead of the tubing, using secondhand equipment wherever possible, and temporary or salvable structures.

Although many operators seem to prefer rotary tools in drilling shallow wells, the use of cable tools might result in appreciable savings because of the smaller cost of rigging up and tearing down even though more time might be used to complete the wells with cable tools.

The water-plant system will include facilities for pumping, storing, treating, and injecting water. Maximum economy can be achieved through the use of carefully planned and coordinated water-treating facilities. Since water-plant installation costs will vary with the type and size of operation, as well as the necessity for pressure, it is impossible to give any satisfactory rule-of-thumb for plant costs.

Installation costs of each lease will include laying water-distribution lines, possible relocation of oil and gas gathering lines if necessary, placement of meters and gaging stations to facilitate accurate periodic gaging of producing wells, installation of water meters, well-head-protection devises for injection wells, and other miscellaneous surface equipment. All of these facilities should be planned in advance as carefully as possible to minimize subsequent changes necessitated by unforeseen developments. Here again costs are related to the individual development plan and no rule-of-thumb for development costs can be given.

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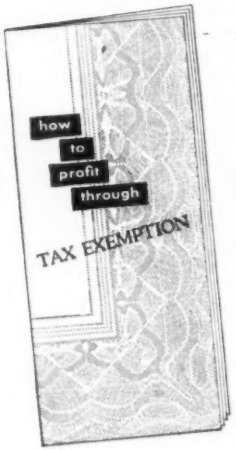

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The expenditure necessary for recompleting wells and remedial work will constitute another major cost item but cannot readily be determined in advance because of the difficulties in estimating the amount of time required to do this work. One difficulty which frequently is overlooked is the necessity for larger pumping units, particularly if the lease has been operated with small units or central powers and jacks. The volume of fluid to be pumped by each well can be estimated in advance with sufficient accuracy to permit the installation of adequate equipment.

Operating costs.—The total operating cost per barrel of produced oil will vary widely over the life of the flooding operation. During the early period of the flood, production will be largely oil and the equipment will be relatively new, requiring few repairs or replacements. During the latter years of the flood, with high water-oil-ratio production, more frequent well pulling and replacement of worn and corroded equipment can be expected which, with a declining oil production, will result in an increasing lifting cost per barrel of oil.

Water-injection costs per barrel of water will vary depending upon the source and type of water, the amount of treating required, and the surface pressure required for an adequate injection rate. These costs usually will not exceed 1 or 2 cents per barrel of water, although occasionally they may be as low as 0.1 cent per barrel or as high as 5 cents per barrel. Water costs tend to remain relatively constant during the life of the flood.

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10. M. Muskat, op. cit., p. 697.

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Sweet-Oil-Well Corrosion

(Continued from page 118)

50 per cent water. Very recently a value of 40 per cent was tentatively established for one field in Venezuela.

The effect of water production upon corrosion activity is illustrated in Figs. 6 and 7.

It has been established empirically for wells approximately 5,000 ft. in depth that iron loss in excess of 0.5 lb. per day is indicative of severe attack. Thus, these data show that for this particular field the critical quantity is reached at 50 bbl. of water per day.

Pounds of iron loss are related with per cent water in Fig. 7. For this field the critical value is 55 per cent. Instances have been reported where cited critical values vary within a given well, dependent upon producing equipment. In one field, for example, water percentages of 98 per cent can be tolerated on flowing wells with little effect; whereas corrosion activity is severe when 70 per cent water is produced by gas lift. These data, on the other hand, are contradicted by reports on other fields which show that severe attack takes place when little or no gas is used for lift purposes.

The drop-size ratio is felt to provide a key to the explanation of dis-

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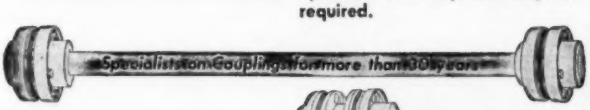

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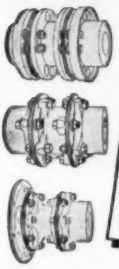

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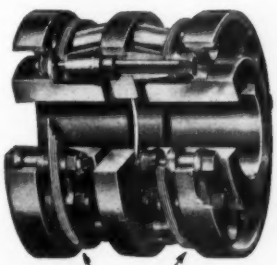

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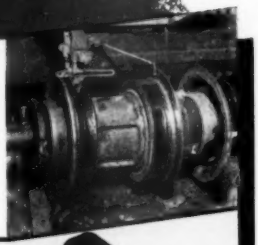

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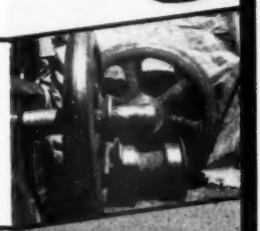

● **CLUTCH BRAKE DRUM**
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cussed variations. If this relation can be established by compilation of empirical data on a sufficiently large number of wells, an important step toward accurately predicting corrosion will have been achieved. Production characteristics of a given well are usually available. Thus, if the relation of these values to an easily measured physical property (such as drop-size ratio) is known, it will be a simple matter to predict not only whether or not a given field is susceptible of attack; but, if so, an approximate date of initial corrosion activity can be anticipated.

The ramifications of a pattern such as this are readily apparent. Prediction and control of corrosion can become a matter of applying known principles rather than the often used trial-and-error methods. Master control sheets can be maintained on wells in all fields where causative agents exist. Then, as the anticipated changeover from the dormant, passive environment to the actively corrosive stage becomes imminent, a careful check of water analysis and coupon exposure tests can dictate remedial action. In this manner premature treatment of thousands of wells can be avoided without danger of costly failure.

The establishment of the aforementioned data is a tremendous task. The accumulation of information from several hundred corrosive and noncorrosive wells will be required. Such information will include:

1. Annual water production.
2. Annual oil production.
3. Injected gas-oil ratio.
4. Produced gas-oil ratio.
5. Corrosion history.
6. Well completion practices.
7. Water analysis.
8. Gas analysis.
9. Drop-size ratio.

Under the best conditions, the collection of these data is difficult and it is impossible for any one company to accomplish it. With the 30 companies pooling their efforts it can be done with a minimum of effort and expense to any one organization. It is hoped to solve a major problem in 1 or 2 years that ould, at best, require many years of work on the part of any one individual.

West Texas' First Sulfur-Recovery Unit

(Continued from page 123)

correct one-third—two-thirds hydrogen sulfide mixtures, and the correct air-hydrogen sulfide mixture required for the steam boiler operation. A temperature recording controller is used for bypassing cooling water around the sulfur cooler, in order to maintain the correct temperature of the liquid sulfur leaving the sulfur cooler, and preventing freezing of the liquid sulfur in the sulfur cooler, which occurs at a temperature of approximately 250° F. An eight-point thermocouple-type temperature recorder is utilized for recording important process temperatures, and for following the progress of the general reactions occurring throughout the system.

Changes in gas composition, water saturation, or metering pressures require resetting of the combustion controls on the sulfur-recovery unit; however, during normal operation, in which acid gas is supplied at continuous rate and at constant temperature and pressure, no resetting of controls is required except to compensate for the density of atmospheric air due to fluctuations in barometric pressure and ambient temperature.

The catalyst employed for the sulfur conversion operation is a high iron-type natural bauxite, and the life of this material is largely dependent upon the rate of attrition, which slowly causes an increased pressure drop to the catalyst bed, and finally necessitates a replacement in a period of from 2 to 3 years, depending upon local operating conditions.

The waste vapors from the sulfur recovery unit do not constitute a nuisance, since they are discharged approximately 65 ft. above grade, and do not contain elemental sulfur in aersol dispersion, and only small traces of hydrogen sulfide and sulfur dioxide.

The entire plant is constructed of carbon steel material, with the exception of the catalyst supports screen,

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which is stainless steel. Cast-iron grating is employed under this screen to support the catalyst, and the function of the screen is to prevent fines from passing through the catalyst bed.

Control Tests

Normal routine plant control tests consist of Orsat analysis on the flue gas from the boiler, and on the residue gas from the unit. A chromic acid solution in concentrated sulfuric acid is used for the determination of sulfur dioxide in the flue gas from the boiler, and caustic potash solution is utilized for the determination of carbon dioxide. Alkaline pyrogallol solution is used for the determination of oxygen. The residue gas from the unit is analyzed for total hydrogen sulfide and sulfur dioxide by means of the chromic acid solution, and oxygen in the residue gas is determined by means of the alkaline pyrogallol. Under normal control conditions, the oxygen in the residue gas from the unit is maintained at approximately 0.20 mol per cent.

Under conditions where the hydrogen sulfide and sulfur dioxide are required to be determined separately, a metered quantity of gas is absorbed in ammoniacal cadmium sulfate solution, and the precipitate is filtered, washed, and titrated with iodine solution for hydrogen sulfide, while sulfur dioxide in the filtrate is oxidized to the sulfate, and determined volumetrically by conventional methods.

The Orsat analysis is conducted in the standard manner, with the exception that mercury is used as the confining fluid, since if water were used the hydrogen sulfide and sulfur dioxide would react in the burette to produce inaccurate and low readings.

The most important plant control test is to be certain that no excess oxygen appears in the system; however, since reducing conditions in the system are also not desirable due to carbon formation on the catalyst, therefore a small amount of oxygen should always be present in the residue gas.

In order to minimize corrosion throughout the system, all the process equipment should be operated above the dew point of water in the system, and for this reason all hot process lines and vessels are insulated and metal jacketed to prevent condensation of moisture.

The sulfur-recovery unit is a joint project by Sid Richardson Carbon Co. and Odessa Natural Gasoline Co., and was engineered by Graff Engineering & Equipment Co. of Dallas. Construction of this project was carried out by Sid Richardson Carbon Co.'s own construction forces.

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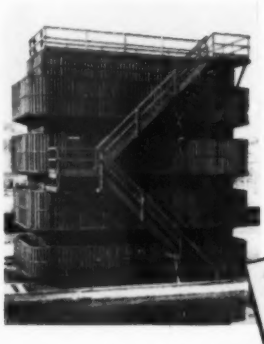

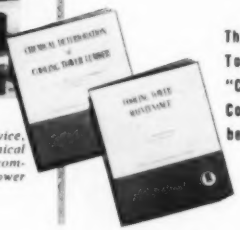

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BOOKS

REPORT ON THE ELEVATED-TEMPERATURE PROPERTIES OF STAINLESS STEELS. Prepared by Ward F. Simmons and Howard C. Ross. Published by the American Society for Testing Materials, 1916 Race Street, Philadelphia. 116 pp. $4.

This report is essentially a graphical summary of elevated-temperature data for the commercially produced stainless steels. Included are summary curves for tensile strength, 0.2 per cent offset yield strength, per cent elongation, per cent reduction of area, stresses for rupture in 100, 1,000, 10,000, and 100,000 hours, and stress for creep rates of 0.0001 and 0.00001 per cent per hour (1 per cent in 10,000 and 100,000 hours). An appendix contains the primary data from which the summary curves were drawn. The data sheets in the appendix give the chemical composition, processing data, and other pertinent information about the steels included in this survey.

INTERPRETATION OF AEROMAGNETIC SURVEYS. By V. Vacquier, Nelson Steenland, Roland G. Henderson, and Isidore Zeitz. Published by the Geological Society of America, 419 West 117 Street, New York 27. 151 pp.

This volume presents a method of interpreting magnetic surveys which, if extensively applied, might yield new knowledge regarding the structure of the earth's crust and shed light on specific problems of regional geology, such as the maximum depth of sedimentation in geologic basins. An attempt is made to describe the origin of magnetic anomalies in geometric terms, so as to give the reader a true perspective of the usefulness and of the inherent limitations of magnetic surveys applied to geological investigations. The work is a cooperative undertaking between the Department of Geology of Columbia University, and the Geophysics Branch of the U. S. Geological Survey.

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The remaining crewmen work at the rotary table operating slips and tongs, when the rig is "on trip." At other times they handle a hundred miscellaneous duties on and around the rig.

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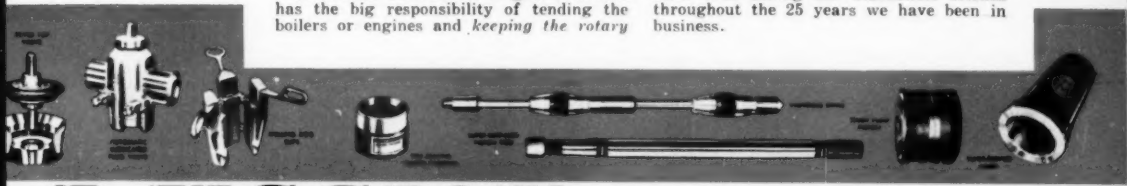

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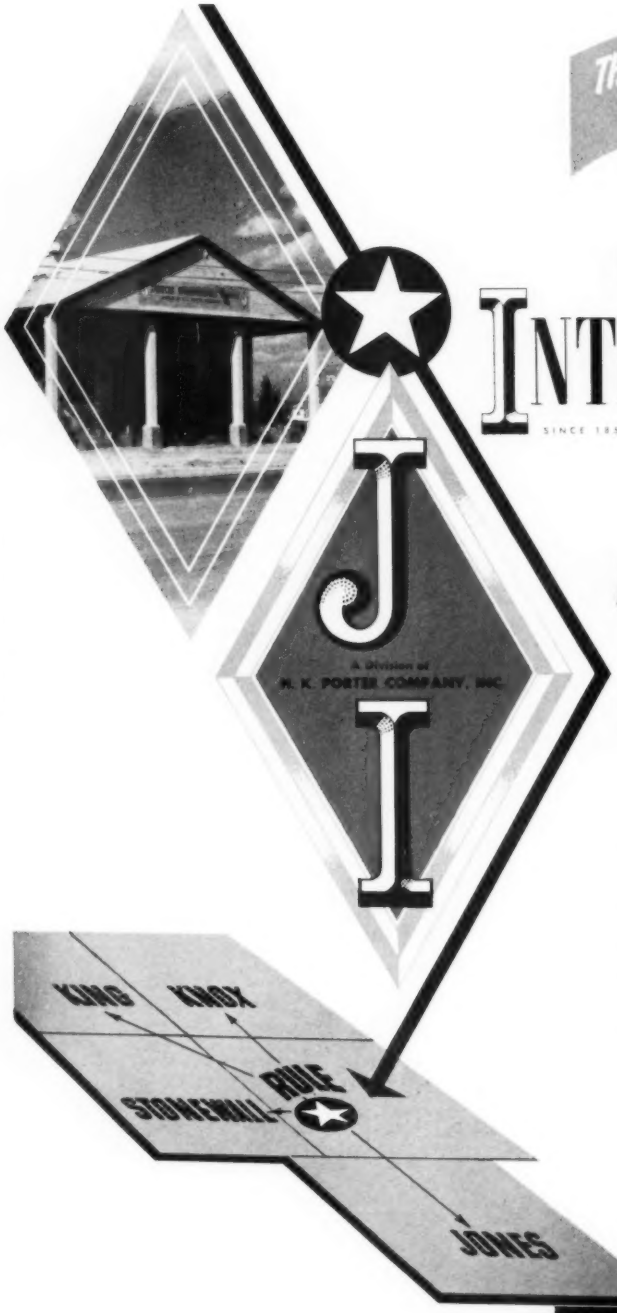

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Geology of the Spraberry Trend

by J. H. Bartley*

It is still apparent that more factual reservoir data will be necessary before the potentialities of Spraberry reservoirs can satisfactorily be evaluated. Some method or device must be introduced to measure and determine the contributing value of the fractures in the section.

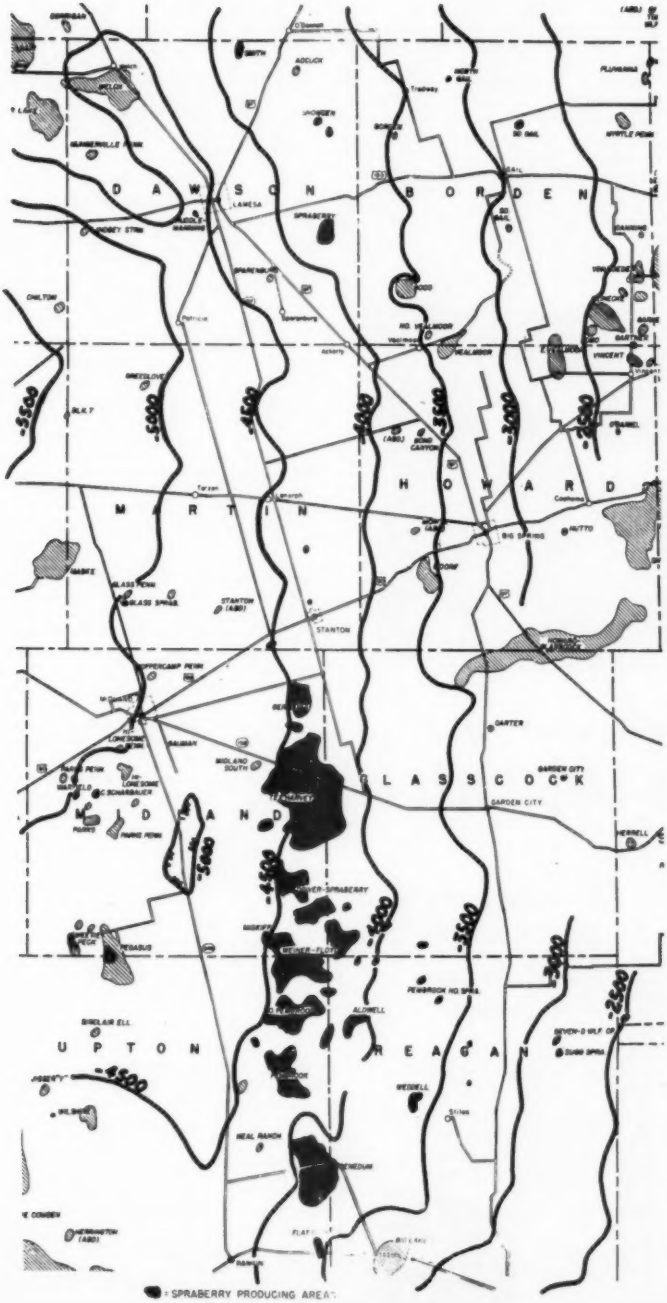

Fig. 1—Map of the Spraberry structure.

LOCATED in the Midland basin portion of the Permian basin of West Texas, the Spraberry sandstone section, which is middle Permian (lower Leonard) in age, is currently revealing the presence of the world's largest known reservoir (see Fig. 1). This trend of development is known as the Spraberry trend, extending throughout eight different counties. It is 128 miles long north to south and 40 to 60 miles wide.

Development

As of March 1, 1952, this area contained 1,223 wells producing from the Spraberry sandstone section, representing 20 producing areas, all of which had produced an accumulative total of approximately 25,580,000 bbl. of oil. The current monthly rate of production is approximately 2,250,000 bbl. of oil. This rate of production on an average daily allowable represents a daily well output of 80 bbl. of oil as compared to the average per well allowable of 160 bbl. of oil per day.

One big field.—The four-county area of Midland, Glasscock, Reagan, and Upton contains the largest known reservoir in the world and represents the south portion of the Spraberry trend area of development. It is readily apparent that most of the Spraberry producing fields in this region will eventually be joined; however, present development shows that 93 per cent of this area is undrilled.

This four-county area, based on present subsurface data, embraces a total of 729,600 acres of proven and semiproven producing area which is approximately five times the size of East Texas field, and assuming 4,000 bbl. of oil per acre recovery, would represent 2,918,400,000 bbl. of oil reserve. An additional 17,000 wells drilled on a 40-acre pattern would be necessary to complete the development of this area.

*Consulting geologist, Midland, Tex. Presented at the spring meeting of Southwestern District A.P.I. Division of Production, Shreveport, La. March 5-7, 1952.

During 1951, the four-county area received the lion's share of Spraberry development and witnessed the assurance that most of the Spraberry production in this area was associated with one common blanket-type reservoir, being segregated into the upper and lower Spraberry sandstone sections, with the best development occurring in the upper section.

Stratigraphy

The Spraberry sandstone section is usually 1,000 ft. thick over most of the Midland basin, with production being obtained from the uppermost 200 to 250 ft. and the lowermost 400 to 500 ft.

The upper section contains three well developed sandstone members with intervening black shales and argillaceous limestone and ranges in thickness from 200 to 250 ft.

The middle section varies in thickness from 300 to 350 ft. and is composed primarily of black shale with an 80-ft. sandstone and/or limestone member occurring in the central portion.

The lower section is similar in composition to that of the upper Spraberry and contains four well-developed sandstone members which are also correlative throughout the Spraberry trend area, representing a thickness ranging from 400 to 500 ft.

From north to south, all of the sandstone members of the upper, middle, and lower Spraberry section are definitely correlable, with each member retaining its proper place in the section with rather minor variations in thickness. To the northwest, north, east, and southeast, the typical facies of sand, shale, and limestone grades laterally to a predominantly limestone or carbonate section, whereas to the west, southwest, and south the complete section grades laterally to an undifferentiated sandstone and shale section, being predominantly shale.

Structure

In all cases, with two exceptions, the accumulation of oil in the Spraberry section is associated with broad, regional, westward-plunging monoclinal nosing, showing maximum closure on these noses of 30 ft., with the major exceptions occurring in the Benedum Spraberry field of eastern central Upton County which exhibits a maximum closure of 195 ft., being associated with a deep-seated pre-Permian Ellenburger faulted anticline, and Spraberry Deep field of east central Dawson County which contains approximately 300 ft. of Spraberry closure as the result of a Pennsylvanian "reef" buildup beneath the Permian section.

The north and west portions of the Spraberry trend exhibit small local accumulations, whereas south of Martin County, in the four-county area, that portion of the trend is represented by low-relief, broad, regional, west-plunging monoclinal nosing with the resultant blanket-type accumulation of oil.

Many of the developed areas produce from both the upper and lower portions of the Spraberry section being dependent upon the better development of the sandstone members and the degree of fracturing. It is evident that the upper Spraberry is the last portion of the section to grade to limestone to the east and likewise is the only section in the eastern extremities of the trend that has possibilities for accumulation of oil, whereas the lower Spraberry is the last portion of the section to become undifferentiated on the west side of the trend and likewise is the only section there that has the better possibilities for the accumulation of oil.

Downwarping in conjunction with compaction was apparently associated with and a contributing factor to cause development of the intricate fracture system of the Spraberry section. In the north half of the trend fracturing is less evident but is nevertheless present, whereas in the south half of the area fracturing is more prevalent and is directly related to the productive ability of wells in that area which makes production of oil commercially possible from the sandstone sections which are otherwise practically impermeable in this area. The primary fractures are vertical and closely spaced

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and are usually open, being better developed in the shale and argillaceous limestone members.

Reservoirs

None of the currently developed Spraberry producing areas exhibit the presence of a clean-cut water table; however, some of the areas which show anticlinal type structure do have a partial water drive for each sandstone member which will vary according to the developed permeability.

In the four-county producing areas where monoclinal noses are associated with accumulation of oil the appearance of water in each sandstone member of both the upper and lower Spraberry is usually of a connate type with water production ranging from zero to as much as 100 per cent without due regard to its appearance in a well relative to that well's proximity to other wells not producing water.

Present reservoir data indicate that practically all of the Spraberry producing areas will be depletion-type reservoirs and that the degree of fracturing will determine the ultimate yield of such reservoirs. However, it should be noted that the reservoirs in the four-county area which extend to the minus (—) 4,500-ft. datum on top of the Spraberry, (to the west of which the section gradually becomes more water saturated unit it is not commercially productive) should receive a certain amount of water drive in conjunction with gas expansion and enjoy a larger ultimate recovery of oil per acre than the productive area updip to the east.

Methanol as a Hydrate Inhibitor

(Continued from page 124)

of exposed pipe at each block valve and drip, and the 2.5 miles of line which passes through creek bottom. (See Fig. 1).

Actual adjustments of the methanol injection rates were made by the field switchers who could only devote a portion of their time to observing pressures and adjusting the control needle valves on the lubricators. It was also difficult for them to ascertain pressure rises caused by hydrate formation from pressure gages as well as line temperature trends by thermometers. Because of these difficulties severe restrictions were frequently allowed to develop which required injection rates as high as 8 gal. of methanol per M.M.c.f. to melt the restriction. Three times the line became completely plugged and required "blowing down" to remove restrictions.

Average injection rate for the first year's operation was 4.23 gal. per M.M.c.f. of total gas. The encouraging feature of this year's operation was that in each of the above cases the methanol injection rate was allowed to fall below the theoretical minimum due to some operational difficulty in the injection equipment. It was assumed that if the injection rate could be accurately adjusted and controlled at or just above this rate, a saving in methanol could be effected and the complete flow restrictions could be eliminated. In view of this it was decided to employ methanol as a hydrate inhibitor for another year with the relatively inexpensive improvements to the injection and control system shown by Fig. 2. These improvements consisted of:

1. A 15 by 30-in. line separator installed 1.7 miles downstream of the 8-in. Chandler drip for the purpose of scrubbing out condensed water vapor before the line reached the hydrate temperature.

2. A positive displacement electrically driven chemical pump with adjustable capacity from 5 to 115 gal. per day, installed at the Tremont methanol station. A duplex pump of the same type with adjustable capacity of 10 to 230 gal. per day installed just downstream of the 30-in. separator for treatment of Choudrant gas plus any additional methanol treatment which would be needed to carry Tremont gas to the plant. This type of pump would afford accurate adjustment and control of the injection rate and pumping through a line

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check valve should have some atomizing effect and insure better vaporization of methanol. The lubricators could be used in the event the chemical pumps had to be shut down for repairs, etc.

3. Pressure recorders installed downstream of the Tremont drip and the 30-in. separator for the purpose of giving assistance to the field switchers in ascertaining pressure rises due to hydrate formation.

4. A temperature recorder placed upstream of the Choudrant tiein for indicating minimum line temperature of the Tremont gas. Another temperature recorder was placed at the plant inlet for indicating the minimum line temperature of the combined Tremont and Choudrant gas. These recorders were installed for the purpose of assisting the switchers in discerning when atmospheric influences began to affect the line temperatures so that methanol would not be wasted by anticipating its effect. The continuous line temperature and pressure records and the daily methanol injection logs would make possible a thorough analysis of the effectiveness of methanol injection and the efficiency by which the injection rate was being controlled.

5. The field switchers were supplied alcohol injection guide tables which specified the theoretical amount of methanol required for any given line temperature and gas volume, for both the Tremont and Choudrant line.

A brief outline of the procedure used to compute the tables for the Tremont gas is as follows:

(a) The water entering the Tremont line per M.M.c.f. was determined by assuming the gas leaving the Tremont drip was saturated with water vapor at is normal operating temperature and pressure, then referring to the chart, "Water Vapor Content of Natural Gas at Saturation."[4] For example, the normal operating temperature and pressure of the Tremont drip was 1,080 psig. and 90° F.; therefore the gas leaving this drip normally contained 45 lb. of water per M.M.c.f.

(b) The water which would condense in the line per M.M.c.f. at various line temperatures and an average operating pressure was determined by subtracting the water content of the gas at the assumed conditions from the water content of the gas entering the line. For example, the line conditions just upstream of the Choudrant field averaged 55° F. and 1,070 psig.; therefore the water content of the gas at this point would be 15 lb. of water per M.M.c.f. The water which would condense in the line would be 45 minus 15 or 30 lb.

(c) The quantity of methanol necessary to depress the hydrate point of the liquid phase below the various conditions assumed above was determined from extrapolation of chart by E. G. Hammerschmidt.[1] For example, extrapolation indicates that at 550 and 1,070 psig. a solution containing 10 per cent by weight of methanol would be required to depress hydrate formation. To form 10 per cent solution of methanol, 3.3 lb. of methanol would have to be added to the 30 lb. of condensed water vapor per M.M.c.f.

(d) The quantity of methanol which must be added to the vapor phase was determined from extrapolation of chart by Hammerschmidt[1] which specified the necessary methanol concentration in the vapor phase to maintain a given weight per cent in the liquid phase for various temperatures and pressures. For example, to maintain a 10 per cent solution of methanol at 55° F. and 1,070 psig. requires 16.4 lb. per M.M.c.f. of methanol in the vapor.

(e) The methanol contained in the gas and liquid phases was added together for each assumed condition and the total required methanol for inhibiting hydrates per M.M.c.f. was plotted versus line temperature. The total methanol to be injected for the above example would be 3.3 plus 16.4 equals 19.7 lb. or 3.0 gal. per M.M.c.f.

(f) From this plot a tabulation was constructed specifying the total required methanol in gallons per day for each M.M.c.f. and °F. change in the gas capacity and line temperature within the operational limits of the pipe line.

All of the improvements made to the methanol injection system accomplished their purpose with the result that there were no flow restrictions by hydrates which caused loss of production in spite of the most severe and longest winter season in approximately 10 years. This was accomplished by careful and efficient operation of the revised system by the field personnel. The average methanol injection rate for both fields was reduced from 4.23 to 2.96 gal. per M.M.c.f., which is well below the theoretical average.

It is believed that the injection could be maintained below the theoretical rate for the following reasons:

1. A constant effort was made by the field personnel to reduce the injection rate to the minimum before excessive flow restrictions would occur. The lines were, therefore, normally operated with "partial" restrictions due to hydrate formation.

2. The assumption was made in computing the theoretical injection rate that there was no carryover of entrained water in the line drips. There was, of course, "some" carryover of 15 per cent by weight salt water solution at each line drip which had the effect of depressing the hydrate point.

Methanol injection was again used as a hydrate inhibitor for the 1951-52 winter season. Need for methanol treatment of the Tremont gas has been entirely eliminated by taking the 6-in. drip downstream of the Tremont battery out of service and allowing 18 bbl. of distillate and 31 bbl. of salt water (15 per cent by weight) to flow down the gas line to the 8-in. drip downstream of the Choudrant tiein. This operation has the twofold effect of reducing the hydrate temperature approximately 10° F. and adding considerable total heat to the line. The corrosive action of the salt solution on the pipe has been arrested by employing a water soluble corrosion inhibitor.

The methanol injection rate of gallons per M.M.c.f. on the basis of both Choudrant and Tremont gas was reduced to 1.85 for one month's operation in the 1951-52 winter season. Considering the unit cost of methanol for this year, treatment cost for methanol, only, is $0.65 per M.M.c.f. (Tank-car price $0.35 per gallon). It will be necessary to sustain this expense for only about 3 months per year, which makes the total yearly operating cost for hydrate prevention extremely low.

Consideration is presently being given to a system for controlling the injection rate at the 30-in. separator by means of a pressure controller which would adjust the injection rate on the basis of the line pressure at the point of injection. This type of control would insure that the injection rate was maintained at the minimum before any appreciable restriction could develop.

Acknowledgment

The author wishes to acknowledge the assistance rendered by Wayne Jenkins of The California Co. in collection and preparation of these data.

References

1. Hammerschmidt, E. C. Preventing and Removing Hydrates in Natural Gas Pipe lines, The Oil and Gas Journal, Vol. 37, No. 52, 1939, pp. 66, 69, 71, 72.

2. Gas composition of Tremont-Choudrant Gas—Mol per cent CO_2-2.7, C_1-87.33, C_2-5.87, C_3-2.35, C_4-0.85, C_5-0.49, C_6-0.23, C_7-0.18.

3. McCarthy, Boyd, and Reid, Water-Vapor Content of Natural Gas at Saturation; Engineering Data Book of Supply Men's Association, 1951.

BOOK

RESUME OF ROCKY MOUNTAIN OIL AND GAS OPERATIONS IN 1951. Published by Petroleum Information, Inc., Continental Oil Building, Denver. 265 pp. $10.

A specialized, detailed, informative book which should prove especially interesting to operators attracted by the great potentialities of the Rocky Mountain region. A statistical section lists each of approximately 1,700 wells drilled in the 11-state area last year. This section is organized around the great oil basins, but the fringe areas are not neglected. All discoveries made during the past year in this big area receive detail discussion with orienting maps and electric-log reproductions. For each area there is a discussion of all factors affecting oil and gas exploration, leasing, discovery, and development. Other sections are devoted to unitization, listing all units approved as of the first of the year. There is a detailed study of geophysical activity. There are also a number of special charts and graphs on phases of oil production, refinery operations, transportation, and pipe lines.

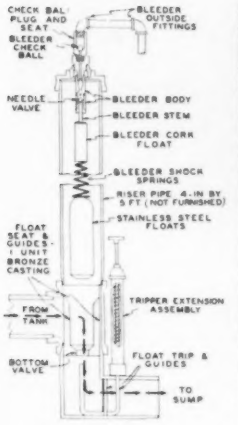

Fig. 1.

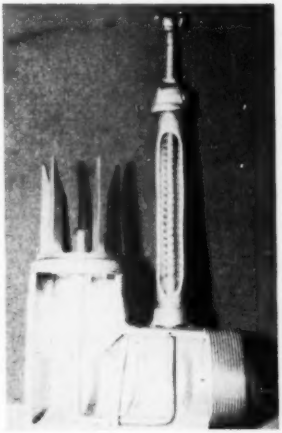

Fig. 2.

Fig 3.

CROSS-SECTION drawing of automatic air bleeder and shutoff valve (Fig. 1). Lucite cylinder which acts as check valve against reverse flow is not shown. Tripper unit (Fig. 2), with lucite cylinder and float seat-and-guides unit of "L" type valve. Installation of bleeder-shutoff valve (Fig. 3) in Hurricane Creek field by Magnolia Petroleum Co.

"Bleeding" Made Easy

Magnolia saves time by using bleeder-shutoff valve to let air escape from gathering line before reaching pump

SINCE manual bleeding of air or gas is time consuming and inconvenient, various installations have been made using automatic air bleeders.

One such installation is that of Magnolia Petroleum Co. in Hurricane Creek field of South Louisiana.

Magnolia uses 4-in. Cronkhite "L" type automatic pipe-line shutoff valves with ¼-in. air bleeders. Such a valve is installed to serve a battery of lease tanks allowing air to escape from the main gathering line before reaching the positive displacement-type pump.

Fig. 1 indicates how this type of bleeder valve operates. With oil flowing from the tank, air can escape through portholes in the bleeder body, continue through the top valve opening (since the cone-plug needle valve in the bleeder body is not seated at this time) and past the ball check valve, out the bleeder line.

How it works.—The operator waits until the riser pipe fills with oil. When air stops coming out of the bleeder, the trip handle is raised to unseat the stainless-steel float so that it rises above the float seat-and-guides unit. With the float unseated (bottom valve open) oil can flow to the pump section as indicated by the arrows.

The air bleeder valve at the top remains open to the atmosphere until the oil raises the float sufficiently so that the bleeder stem or shaft is actuated and moves upward until the cone plug at the end of this stem seats and closes the top valve. However, if a "slug" of gas or air accumulates in the riser pipe, the float will drop. This will open the top valve again, permitting escape of air.

When the flow in the line stops and the oil level in the barrel falls the stainless-steel float will come down between the float guides and will seat, thus closing the bottom valve and preventing air from being drawn into the gathering line. With the ball check valve closed, when no air is escaping, a partial vacuum is created in the riser that ends to hold some oil up there. This oil will remain in the riser until the next time crude is moved.

Other features.—An additional feature of this "L" type valve is a cylinder made of lucite which rides on one leg of the float trip. This is designed to perform the function of a check valve, acting to shut off any flow of oil in a direction opposite to that indicated in Fig. 1. If such a flow should occur the lucite cylinder will rise until it seats against the bottom of the float seat-and-guides unit, thus shutting off this reverse flow.

A maintenance problem that may arise with this type of bleeder is that of accumulation of paraffin, dirt, or particles in the bleeder ports and around the valve seats. For this reason, the bleeder-valve assembly is designed for quick disconnection so that ball check and plug seat as well as needle valve and air ports can be easily cleaned.

Skid Bar Serves as Safety Measure on Bell & Burden Rig

An auxiliary skid bar serves as a safety measure on Bell & Burden's new drilling rig at Ventura, Calif., to provide protection if and should conventional timbers ever break.

Unloading of drill pipe or casing is accomplished in the usual manner, using a timber skid between the truck and rack.

The rack sections are equipped with pocket-type plates welded to the extreme end of the top sill in which timber is inserted. This plate has side rails to prevent the timber from falling away. However, it may break under load.

As a safety feature an extension of the top sill is built into the rack by using pipe one size smaller in diameter, which slides easily into the top sill. The outer end of this pipe is provided with a vertical post which rests on the ground, or on a short piece of derrick timber to prevent it from sinking into soft ground.

The sole function of this auxiliary bar is to prevent the joint of drill pipe or casing from sinking to the roadway if the timber should break.

Slipping into the top sill, the extension is pinned in place for moving, and the same pin is used in other matching holes when extended.

SKID BAR shown installed on pipe rack of Bell & Burden's drilling rig at Ventura, Calif. It provides extra protection should conventional timbers ever break.

Pipe-Support Frame Is Used To Easily Clean 2-in. Pipe

Rex Burnell, of Yale Gas Co., Yale, Okla., has developed a pipe-support frame for use in cleaning 2-in. pipe.

The support is fabricated from 1-in. pipe as shown in the accompanying diagram. The semicircular piece shown at the top of the frame is made from a 2-in. saddle clip. The bottom hook is an old bolt welded into the end of the 1-in. pipe.

When in operation, the 14-ft. length of pipe is placed on the ground. The 2-in. piece of pipe to be cleaned is placed against the hook and into the saddle stirrup. A slight push from the end of the pipe against the hook is all that is necessary to raise the frame to upright position.

With the 2-in. pipe supported on the frame, cleaning is made fast and easy, and at the same time a thorough job can be done.

PIPE-SUPPORT-FRAME diagram. It was designed by Rex Burnell of Yale Gas Co., Yale, Okla., and is used in cleaning 2-in. pipe.

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Dual Ignition Applications. Opens battery circuit and grounds magneto.

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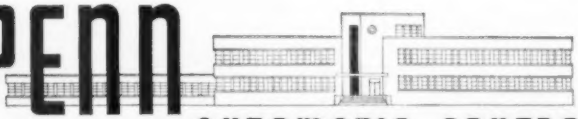

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"Convertible" Truck

Trucks can quickly be converted into boom jobs for handling heavy materials, or reconverted for use as flat beds. Special holes drilled in the truck bed provide a place to anchor the boom rigging which contains an X frame of structural steel, the rear fitted with shoes to prevent it from being winched too far toward the truck. Entire rig is balanced so that sled-runner tips of the sills point up while the boom post lies flat. When boom is mounted on the truck, driver backs squarely against the two side sills so they will match the line where they lie after mounting. Winch line is hooked on the rear cross-member and loading is started. As soon as center of gravity has been passed, sills of the boom drop to the truck floor, and a short pull spots the anchor holes. Bolts are inserted and the truck is ready for use.

PIPE RACK of Santa Fe Drilling Co. is simple.

FOOT is supported on short piece of timber.

WALK is similar to the pipe-rack sills.

Simple Pipe Rack

It is inexpensive, but handy, Santa Fe reports

A SIMPLE and inexpensive pipe rack is now in use in California by Santa Fe Drilling Co.

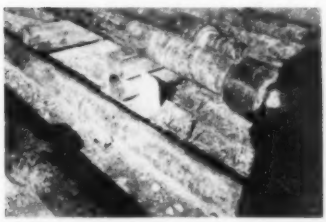
This rack was designed to be placed at ground level on a graded area, and the walk contains only the base essentials necessary for operation.

Each sill (only six are being used) consists of a joint of 4-in. pipe, with a flat foot at each end, and two intermediate which set on short pieces of timber to prevent settling.

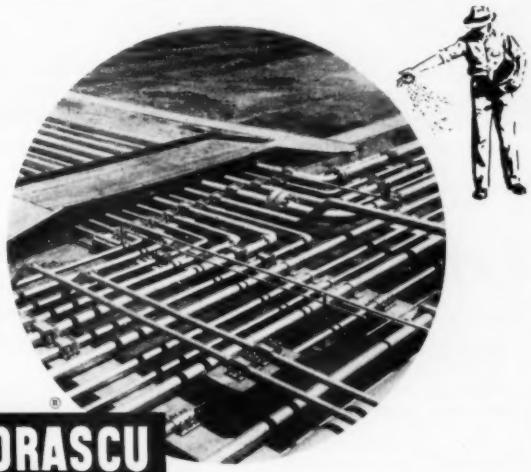
Feet are made of pieces of I-beams with the top flange removed so that a notch of the desired dimensions can be cut to receive the piece of 4-in. pipe. The feet are welded permanently to the pipe sills.

A saddle is attached to the end of the pipe sill into which timber is placed to act as a cushion for the drill pipe or casing.

No connections are necessary between the sills of the rack and the walk, as the ends of the pipe butt squarely against the side sills of the walk and require no anchors. Walkway is built in three sections.



FOUR-INCH pipe for sills has flat feet at each end and at intermediate points. These are placed on planking laid directly on the ground, as this photograph shows.



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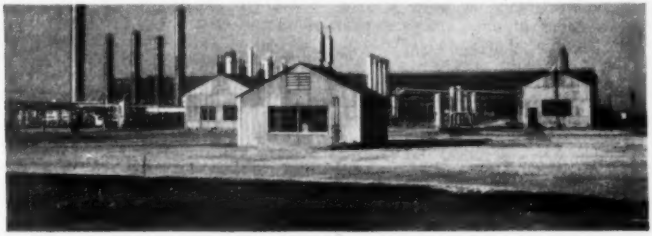
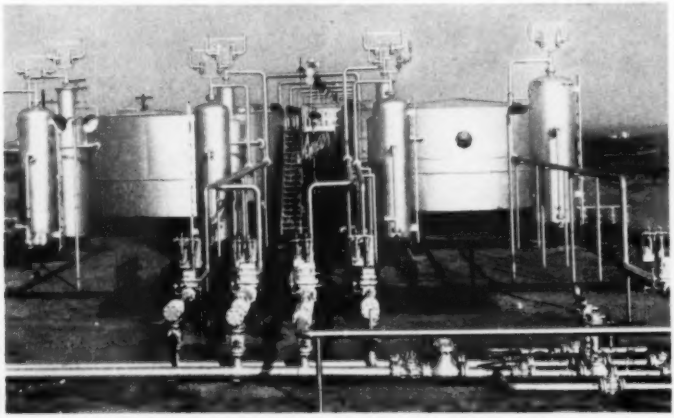




LOW AND HIGH-PRESSURE traps in foreground, with vapor-recovery tanks, on Sunray Oil Corp.'s Dessel lease in the Guijarral Hills, Calif., area. This is similar to the type of equipment now in use on all Sunray tank batteries in the area.

"Extra" Liquids Saved

Sunray has installed vapor-recovery equipment on all its Guijarral Hills, Calif., leases; big savings noted

A YEAR ago vapor-recovery equipment was placed on all of Sunray Oil Corp.'s field oil-storage-tank batteries at Guijarral Hills, Calif., which has resulted in considerable savings.

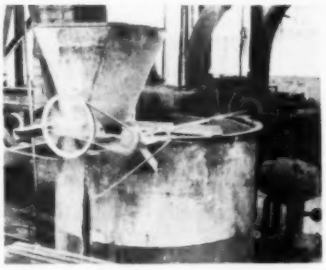
In fact, within a few months all installation costs were amortized, and day after day the systems are continuing to "pay off."

Melroy Welch, general gas and gasoline superintendent of the company's California division, estimates that the gas and liquid products saved by the systems during the first 10 months of operation were valued at just under $100,000.

Last August when the hot days caused an abundance of vapors to be released or "flashed," a total of 16,082,000 cu. ft. of vapors was recovered.

Skimmed off.—Traps skim off most of the liquefiable fractions, but vapors separating from the crude oil while it is in lease tankage are concentrated with propanes, butanes, and pentanes, which, when condensed, become L.P.G. products.

The ground-level gaging feature of Sunray's Guijarral Hills, Calif., properties is handy for gagers and pumpers. Jack Hiatt and Ray Reed, No. 1 gager and pumper, respectively, and their assistants, Bernie Paulson and Bob Hill, no longer have to make countless trips up and down tank stairways.



MIXER, made from salvage materials, is used to mix lime and other solutions.

Salvage Materials Used to Make Lime-Solution Mixer

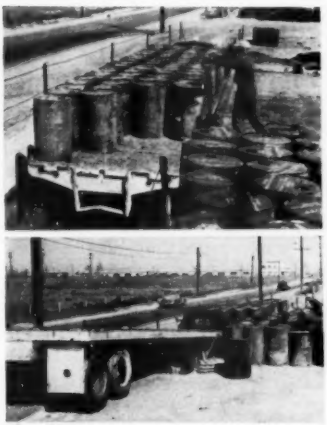
Delta Refining Co., Memphis, has built an apparatus from salvage materials for mixing of lime or other solutions.

A small cylindrical tank with an open end is used for the vessel. Power to drive the operating parts is supplied by a small electric motor operating through a gear-case speed reducer.

Mixing is done in two steps: (1) Powdered lime is fed into the tank by means of a positive-drive screw conveyor, and (2) Mixing dissolves the powder in water in the cylindrical tank. Stirring is by means of a paddle adapted from the rear axle of an old automobile.

One of the axle housings was removed so the differential might be pinned by stopping the turning of the stub axle in the cut-off housing. The opposite axle was supplied with a V-belt sheave and the entire assembly mounted on the rim of the mixing tank.

Conveyor and paddle are operated from the electric motor through V-belt drives, as shown in the photograph.



LOADING DOCK.—Top, a flat-bed truck is being loaded on the recessed ramp. Bottom, a second truck waits to enter loading area. Front truck will drive on through the back entrance.

Trucks Efficiently Loaded Without Hoists or Cranes

Flat-bed transport trucks are being loaded quickly without use of cranes or hoists, thanks to a depressed ramp built beside the filling and storage platform where asphalt is barreled for shipment at Envoy Petroleum Co.'s Long Beach, Calif., refinery.

The excavated ramp is finished with concrete walls, and can hold two standard trucks at one time. It is located beside a paved street with access at both ends so a truck can move into the loading zone and out at the opposite end without having to back up. Depth of the ramp places the flat beds on a level with the paved area where drums are filled for shipment.

Dollies roll easily across the space between truck bed and platform. Drums can be trucked to the transport trucks without being stored, thus eliminating need for special hoists.

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RIDGES on crankshafts are ground as desired with this lapping collar, shown closed, left, and open, right. Rope in photograph at left is used in the process.

Effective Grinder

Lapping collar grinds out ridges on crankshafts

THE crankshaft lapping collar shown in the two photographs at upper left is used for grinding out ridges on crankshafts when the ridges are too hard to be filed off.

The collar is machined from cast iron to the exact size of the piston-rod bearing. Spiral grooves are turned in opposite directions from each end inside the collar, and bolts fastened through lips running lengthwise along each side of the collar are used for adjusting pressure of the collar against the shaft.

Ropes attached to opposite sides of the collar, as shown at far left, complete the assembly.

How it's done.—To use this device, lapping compound is placed in the collar and the collar is clamped to the crankshaft. Collar bolts are tightened to give the desired pressure and a man placed on each rope. The collar is then "see-sawed" back and forth for about 10 minutes.

After that time the engine is jacked over one-eighth revolution and the grinding procedure repeated.

Spiral grooves tend to work the lapping compound back and forth in the collar without allowing it to work out either end. As the crankshaft is ground down, bolts are periodically tightened on the collar. Lapping compound is cleaned out and the crankshaft checked with micrometer approximately every 30 minutes.

This mechanism was described at the recent "Operating Kinks" session of the Permian basin regional meeting of the Natural Gasoline Association of America, at Odessa, Tex.

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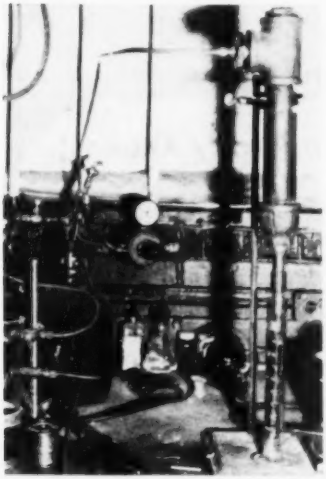

FILTER set up in laboratory at Phillips Oil Co.'s Sweeny, Tex., refinery.

Pressure Filters

Laboratory pressure filter made from standard fittings

WHEN the need for an inexpensive laboratory pressure filter arises, a look in the supply catalogs shows that such an instrument does not exist. "Inexpensive," that is.

However, one can be quickly made from standard pipe fittings. The bill of materials for the one shown in the photograph is as follows:

1—2-in. plug
1—2-in. tee
1—2 by ¼-in. bushing
1—2 by 6-in. nipple
1—2 by ⅜-in. bell reducer
2—⅜ by 2-in. nipples
1—⅜-in. coupling.

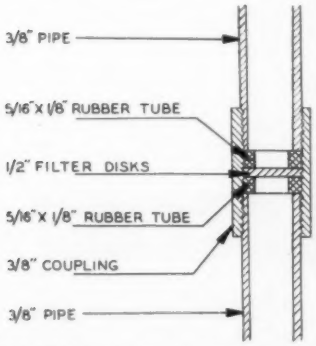

DIAGRAM of filter, showing its assembly.

A cutaway drawing of the filter element is shown. The gaskets are cut from standard laboratory rubber tubing, and the filter disks are cut with a ½-in. cork borer. If desired, a disk of copper or steel screen can also be cut with the cork borer and used to reinforce the filter paper disks.

Simple operation.—Operation is quite simple. The filter is assembled; the filter element needs only to be hand tight. The upper plug is removed and the liquid to be filtered is poured in.

The plug is replaced and air pressure is applied to the bushing. The filter paper will take up to 20 psi., without rupturing.

In some cases, it is necessary to refilter the first 10-20 ml. since perfect clarity may not be obtained until a filter cake is built up. The design can be modified to meet individual need.

This unit was designed by Phillips Oil Co. at its Sweeny, Tex., refinery.

WICKES

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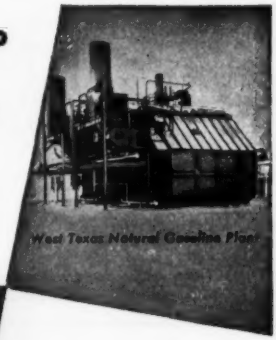
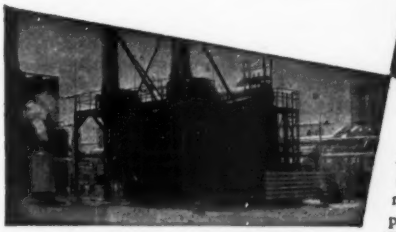
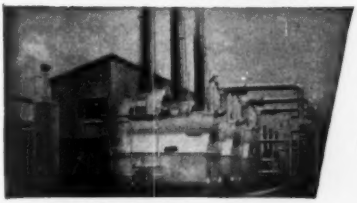


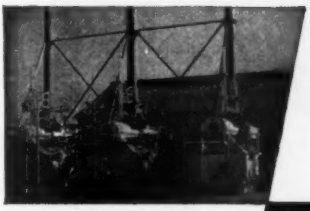
West Texas Natural Gasoline Plant



Central Texas Natural Gasoline Plant



Louisiana Refinery



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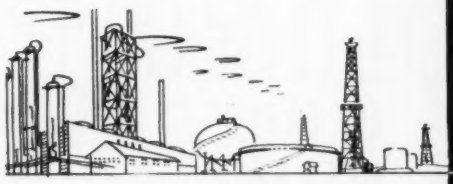


No. 3

PUMPS:

Part 3: Pumping Volatile Liquids

by Gerald L. Farrar
Engineering Editor

THE discussion of volatile liquid pumping is continued from April 7 and April 14, in which issues important pump suction considerations were reviewed. Factors of system layout and operating conditions for reciprocating and centrifugal pumps in volatile liquid service are now to be considered.

Reciprocating pumps.—Reciprocating pumps have long been adapted for pumping volatile liquids. Design modifications, necessary to convert pumps suitable for ordinary service to volatile liquid service, include shorter passageways, deeper stuffing boxes, and ring-and-groove gasketing. A close-clearance simplex pump is most successful in this application. When pumping hot oil, little additional attention is given to the lubrication problem since the oil itself has good lubricating properties.

When processing butane and lighter fractions, additional improvements are necessary. The ratio of length of stroke to piston diameter is increased. Closer clearances are used, and entrances and exits are made short and direct. Lantern glands for conducting lubricant to the packing are used. This step is necessary because of the lack of lubricating action of the light petroleum fractions.

It is seen from the foregoing that use of conventional pumps for volatile liquid pumping, and particularly for pumping of light fractions, will not be successful. It is necessary that the pump be designed to do the job.

Centrifugal pumps.—The centrifugal pump is widely utilized throughout the oil industry for such volatile-liquid applications as boiler feed, condensate, hot oil, and volatile products such as natural gasoline, L.P.G., and gasoline. If this type of pump is to be successful in the pumping of volatile liquids, certain operating pointers should be kept in mind. Some of these are listed below. Pointers for these applications may be applied to others of a similar nature.

1. It is extremely important for satisfactory operation that sufficient NPSH be available at the pump suction flange. As previously mentioned, correlations should be obtained from the pump manufacturer or from the Standards of the Hydraulic Institute.

The determination of NPSH of pump handling volatile multicomponent hydrocarbons, such as natural gasoline, should be based on the true vapor pressure of the pumped liquid at the actual pumping temperature. For materials undergoing processing in refining operations the true vapor pressure is usually available; however, the Reid vapor pressure is usually the only information available when handling finished petroleum products. Due to certain inadequacies in the test procedure, Reid vapor pressure is usually lower than the true vapor pressure. If composition is known, Reid vapor pressure may be converted to true vapor pressure by standard conversion charts.

2. Fluctuations of pump suction pressure due to sudden load changes and resultant reduction in the pressure on the suction side of the pump should be avoided. In cases where it is not possible to maintain suction pressure at a safe level to prevent flashing, provision should be made for cold fluid to be introduced into the suction pumping system, preferably directly at the pump inlet.

3. Suction piping should be short and direct as possible with a minimum of fittings, and horizontal runs should be of ample size to provide low velocities.

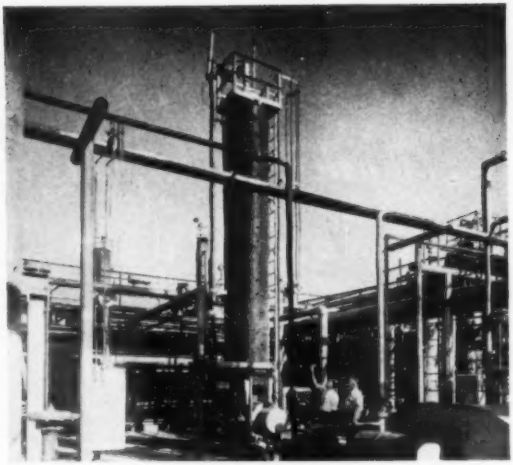
4. The suction piping should be arranged to avoid any accumulation of vapor. Provisions should be made to allow self-venting of vapors in the pump by venting the eye of the first-stage impeller except where the suction nozzle is in a vertical position. When possible the vent opening should be connected with the vapor space in the suction vessel.

5. Provision should be made for recirculating a portion of the pump discharge to suction. This bypass is used for control and also should be opened wide during starting and stopping and during periods of low pump capacity operation in order to prevent overheating of the pump.

6. The suction pressure on the pump may vary over a wide range and often little or no leakage can be tolerated due to the toxic and inflammable nature of the pumped fluid. For this reason the stuffing box may require the use of a mechanical seal. If packed it may be necessary to use one or more of the following preventive measures: water jacketing, bleedoff connection, seal cage for an oil or grease seal, or smothering-type gland.

Stuffing boxes operating under vacuum should be provided with seal cages connected to a dependable supply of seal water or oil. Seal cages are not required on stuffing boxes which are under pressure at all loads. Provision should be made to prevent air leakage between the shaft sleeve and the shaft.

7. The suction and discharge piping should be supported properly to avoid undue pipe strains on the pump. When pumping at high temperatures the support of the pump should be arranged in such manner as to permit expansion of the pump casing without adversely affecting the coupling alignment, and should be sufficiently rigid to resist reasonable pipe strains. **The unit should be aligned at operating temperature.**



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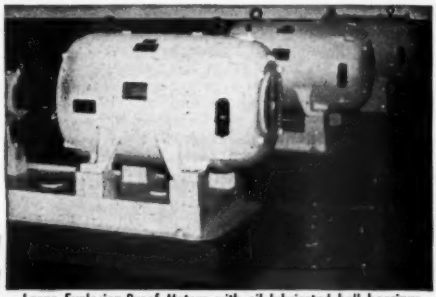

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QUESTIONS ON TECHNOLOGY

by W. L. Nelson
Technical Editor

Asphalts From Eastern Venezuelan Crude Oils

Your "Properties of Venezuelan Crude Oils" of the Third World Petroleum Congress at The Hague was useful to us but it does not indicate anything of the quality of the asphalts from eastern Venezuelan crude oils. What are the properties of the asphalts from the following crude oils: Chimire, Jusepin, Mara, Nipa, Oficina, and Quiriquire?—R. P. S.

The eastern Venezuelan crude oils are relatively high in gravity and for this reason the yields of asphalt are not as great as from some of the heavier western crudes. In general, the relative yields can be judged from the percentage of material that boils above 900° F. (although, of course, such a material is too soft for asphalt). A comparison of yields is given in Table 1.

Only meager data are available on the asphalts produced from eastern Venezuelan crude oils. Nevertheless, from general considerations, it would seem that satisfactory or good asphalts could be produced from Quiriquire, heavy Oficina (below 30° A.P.I.), heavy Guara (below 30° A.P.I.), and Mulata. Reasonably good asphalts might be produced from the lighter Oficina and Guara crude oils but in general they tend to be waxy. Jusepin, Chimire, Mara, and Nipa are clearly paraffinic and would contain so much wax that the ductilities of the asphalts should be low. However, low-gravity crude oils contain better asphalt, and hence relatively low-gravity crude oils from any of the above named fields (except Mara) might contain satisfactory asphalts.

A few scattered data on asphalts that have been produced from eastern Venezuelan crude oils are shown in Table 2.

TABLE 1—RESIDUE AND ASPHALT YIELDS OF EASTERN VENEZUELAN CRUDE OILS

Avg. crude oils		Specific eastern crude oils			
°A.P.I. gravity	Per cent boiling above 900° F.	°A.P.I. gravity	Name	Per cent —100 pene. (approx.)	Per cent boiling above 900° F.
18	43.7	17.2	Quiriquire	29.6	39.0
		18.3	Quiriquire	26.3	36.5
20	39.3				
22	34.9				
24	31.8				
26	29.0	26.4	Oficina	36.6	36.5
28	26.2				
30	23.8	30.3	Oficina	19.7	19.7
		31.8	Jusepin	11.0	23.0
32	21.3	32.4	Oficina	21.8	21.0
34	19.0	34.3	Chimire	10.4	15.5
		36.5	Guara	12.0	9.0
36	16.9	36.8	Oficina	12.1	16.4
38	14.9	38.8	Nipa	3.7	7.5

TABLE 2—ASPHALTS FROM SOME EASTERN VENEZUELAN CRUDE OILS

	Asphalt						Solubility		
Name of crude oil—	°A.P.I. gravity	Per cent	Pene. at 77° F.	Sp. gr. 60° F.	°A.P.I. gravity	Softening point R. & B., °F.	Naphtha	CCl_4	Ductility (cm.)
Chimire	34.3	6.7	*18	1.051	3.2	136.5	92.1	99.2	
Jusepin	31.8	7.3	24	1.025	6.6				
	31.8	11.35	120	0.998	10.3				
Mara	30.3	3.7	14	1.076	0				
Nipa	38.8	2.4	*14	1.044	4.0				
Oficina	30.3	18.3	74	1.022	7.0	119.0			76
	30.3	20.7	126	1.015	7.9				
	30.3	22.1	191	1.010	8.6				
	26.4	34.2	75	1.022	7.0	121.0			
	36.8	13.6	181	1.009	8.7	108.0	83.8		
	32.4	20.5	79	1.015	7.9	122.0			
Quiriquire	17.2	27.5	80	1.018	7.5	110.0	95.46		
	18.3	25.2	†88	1.019	7.4				
	18.3	29.6	138						
	18.3	34.0	200	1.008	8.9	108.0			100+

*Penetration of 5 (32/200/60). †Penetration of 4 at 35° F.

Increase in Vessel Costs Since 1946

The January 7, 1952, issue of Cost-imating Indexes carries the cost indexes of many materials items but does not seem to include vessels or tanks. How can we estimate the cost of vessels today from the 1946 costs shown in Cost-imating No. 9 of December 16, 1948, page 113? J.L.

Inasmuch as there are literally hundreds of individual items of equipment, it is obviously impractical to carry the current prices or cost indexes of all of them. However, the indexes shown each quarter under the title of Cost-imating, such as the latest one of January 7, 1952, are the ones that are thought to be most representative and useful. Thus, with regard to the shells of tanks, vessels, towers, absorbers, stacks, etc., the current cost should be closely related to the cost (or cost index) of plate or sheet steel. This item, steel plate, is carried in each quarterly Cost-imating article, and for August 1951 the index was 161, meaning that the cost was 61 per cent above the 1946 cost.

Plate-steel costs have ranged since 1924, as shown in Table 1 (Cost-imating No. 5, The Oil and Gas Journal, November 18, 1948, page 123, and quarterly issues of Cost-imating since 1949).

TABLE 1—COST OF STEEL PLATE SINCE 1924, STATED AS COST INDEXES BASED ON 1946

	Cost Indexes		
Year	Plate steel*	Skilled labor†	Material & labor†
1924	86.0		78.0
1928	76.0		70.0
1932	63.0		59.0
1936	75.0		70.0
1940	85.0		80.0
1944	85.0		86.8
1945	89.0		91.0
1946	**100.0**	**100.0**	**100.0**
1947	117.5	112.0	115.0
1948	144.0	125.0	135.0
1949	144.5	133.9	142.0
1950	151.7	140.0	146.0
1951	161.0*	148.3†	155.0
Jan. 1952	161.0	152.2	157.0

*Cost during 1951, $3.95 per 100 lb. †Hourly rate during 1951, $2.67. ‡Based on 50 : 50 material and labor.

Thus it is necessary that those who use cost indexes be somewhat familiar with the materials that compose equipment or machinery, and to some extent how these equipment are fabricated.

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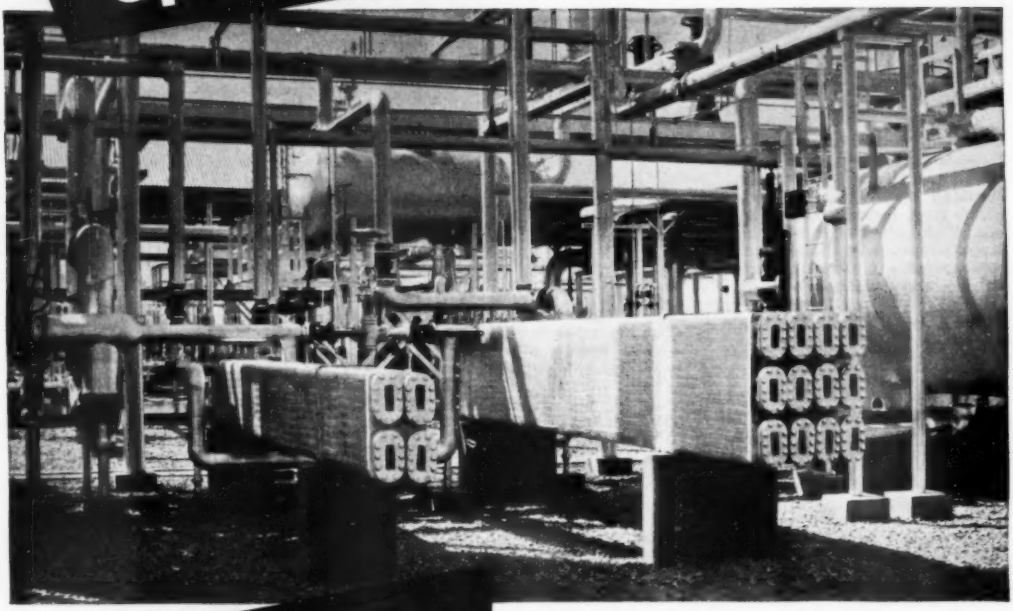

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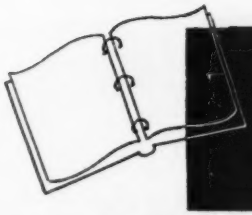

REFINER'S NOTEBOOK

More on Sizing Relief-Valve Discharge Systems*

AN example was given in No. 118 of Refiner's Notebook in which discharge pipe was sized with critical back pressure.

Conditions were:
Set pressure: 200 psig.
Fluid: Air
Inlet temperature at 10 per cent accumulation: 120° F.
Required flow: 20 lb./sec.
Required length of discharge piping: 150 ft.

It was shown that a 4-in. diameter pipe was large enough to handle flow when back pressure was allowed to equal critical flow pressure.

This result will now be compared with that obtained for the following example in which maximum allowable back pressure is limited to 10 per cent of the accumulated absolute upstream pressure.

Solution:

Upstream pressure = 1.10 (200) + 14.7 = 234.7 psia.

Back pressure at valve outlet = 23.5 psia. = 3,385 lb./sq. ft.

Atmospheric pressure at pipe outlet = 14.7 psia. = 2,120 lb./sq. ft.

Pressure drop in pipe, ΔP = 1,265 lb./sq. ft.

Average flowing pressure, P_{ave} = 2,750 lb./sq. ft.

Temperature at valve outlet, constant enthalpy, = 320° K.

$$320° \text{ K.} = 47° \text{ C.} = 117° \text{ F.}$$

Assume temperature at pipe discharge = 70° F.

Average flowing temperature = 93.5° F. = 554° R.

$$\rho_{ave} = \frac{(29)\ (2{,}750)}{(554)\ (1{,}546)}$$

$$= .0931 \text{ lb./cu. ft.}$$

Trial with 4-in. pipe:

$$V_{ave} = \frac{20 \text{ lb./sec.}}{(.0884 \text{ sq. ft.})\ (.093)}$$

$$= 2{,}430 \text{ ft./sec.}$$

*Material from "Principles of Discharge Piping Application . . . Relief Valves," Manual 51-B, Farris Engineering Corp., Palisades Park, N. J.

$$\frac{P}{\rho_{ave}} = \frac{1{,}265}{.0931} = 13{,}600 \text{ ft.}$$

$$W_f = 13{,}600 - \frac{(2{,}430)^2}{64.4}$$

$$= 13{,}600 - 91{,}600$$

W_f resulting in a negative quantity indicates that 4-in. pipe size is inadequate for this condition.

Trial with 6-in. pipe:

$$V_{ave} = \frac{20}{(.2 \text{ sq. ft.})\ (.093)}$$

$$= 1{,}075 \text{ ft./sec.}$$

$$W_f = 13{,}600 - \frac{(1{,}075)^2}{64.4}$$

$$= 13{,}600 - 18{,}000$$

Six-in. pipe still too small.

Trial with 8-in. pipe:

$$V_{ave} = \frac{20}{(.3471)\ (.093)} = 620 \text{ ft./sec.}$$

$$W_f = 13{,}600 - \frac{(620)^2}{64.4}$$

$$= 13{,}600 - 5{,}960 = 7{,}640 \text{ ft.}$$

$$\text{Reynolds No.} = \frac{Dv\rho}{u}$$

$$= \frac{(.665)\ (620)\ (.093)}{(.02)\ (.000672)} = 2.85 \times 10^6$$

$$f = .0134$$

$$L = \frac{(W_f)\ (2gD)}{f v^2}$$

$$= \frac{(7{,}640)\ (64.4)\ (.665)}{(.0134)\ (620)^2}$$

= 63.5 ft. max. length of 8-in. pipe allowable for 10 per cent back pressure.

It is evident from these calculations that an 8-in. pipe is inadequate size to make this run of 150 ft. in order to prevent back pressure exceeding 10 per cent. Calculation should be repeated with 10-in. pipe to see whether this is adequate.

Note that in previous example, a 4-in. pipe was large enough to handle flow when back pressure was allowed to equal the critical flow pressure.

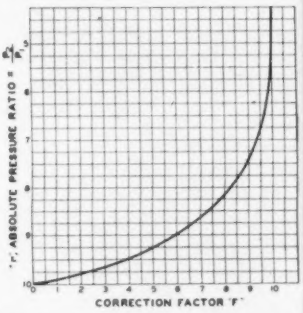

Fig. 1—Graph for determination of capacity factor "C" used in vapor formula: $W = KCAP(M/T)^{1/2}$.

Valve sizing.—A formula for nozzle safety valve capacity for gas or vapor was given in No. 117, Refiner's Notebook. Where specific heats are not known use conservative value of k = 1.001. The formula then becomes:

$$W = 276\ AP(M/T)^{1/2}$$

(90 per cent code reduction factor, C and K are included). Critical set pressure varies with each flowing medium, being 10.7 psig. for saturated steam and 9.5 psig. for vapors and gases, assuming specific heat ratio of 1.001. For back pressures exceeding the critical capacity correction must be made.

References

1. Engineering Research Bulletin No. 31, by Nels E. Sylvander and Donald L. Katz—University of Michigan Press.
2. Pressure Drop in the Flow of Compressible Fluids, by W. E. Lobo, Leo Friend, G. T. Skaperdas—Industrial and Engineering Chemistry.
3. The Thermodynamics of Air at High Velocities, by Neil Bailey—General Electric Co.

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Installation of Permanent Deadman for Guy Line of Pulling Machine

CONSTRUCTION and installation of a deadman is ordinarily quite commonplace and requires no unusual treatment. However, the deadman to be used as permanent anchor for a well-pulling machine is required to be considerably stronger. It is subject to very hard and frequent usage.

Shell Oil Co. personnel have developed a method for construction and installation of this permanent-type deadman, and have utilized the method in Ventura Avenue field, Ventura, Calif.

Approximately 10 ft. of 1-in. rod is used in construction of the deadman. A 6-in. ring is forged in one end to hold the guy line hooks. Two sections of 6-in. pipe, each about 2 ft. long, are center-drilled and placed at right angles to each other. The straight end of the rod is then passed through the drilled holes in both sections of pipe, as shown in Fig. 1, until a length of about 1 ft. extends through the second pipe. This 1-ft. section is bent at right angles to fit along the edge of the pipe. Pipe and rod extension are then continuously welded together throughout the length of contact, and the first pipe is welded to the second pipe.

The unit is picked up by a truck boom and lowered into a hole, 3 ft. in diameter, previously dug to hold the anchor. (See Fig. 2.)

It is desired that the ring be just at ground level, or slightly below. In order to set the ring in the desired position, a 2 by 4 is inserted through the ring, with the ends of the timber resting on the ground beyond hole as shown in Fig. 3. Such an arrangement also assures that the deadman will hang exactly perpendicular, and adjustments may be made until exact centering in the excavation is obtained.

When positioning arrangements have been completed, concrete is poured to fill the excavation completely.

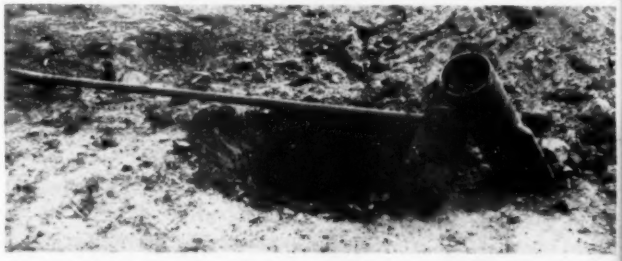

Fig. 1—This photo shows a "tailor-made" location, ready to be inserted for cementing.

Fig. 2—Deadman is picked up by truck boom and lowered into position.

Fig. 3—Deadman is suspended on 2 by 4 until cement hardens. Permanent anchor is then provided for guy line of pulling machine.

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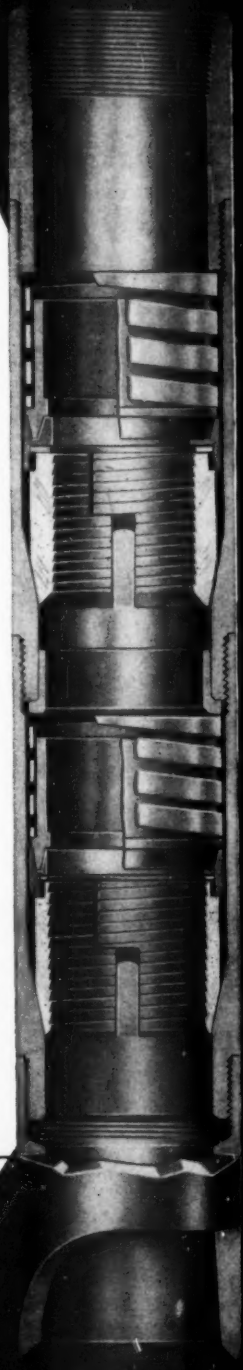

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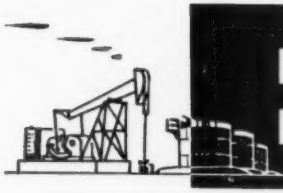

ENGINEERING FUNDAMENTALS

How to Select Transmission Belts—1

THE proper selection of a rubber transmission belt starts with a determination of the maximum horsepower to be handled by the belt. This is obtained by multiplying the rated horsepower of the driving unit (the name-plate rating) by a service factor which represents the overload on the drive while starting. This overload varies with both type of drive unit and the type and use of the driven unit.

A table of service factors (Table 1) is offered here for equipment of the type found in oil industry. This new aid to transmission-belt selection has been prepared by Newell Perry, flat belting engineer, Thermoid Co., Trenton, N. J., and is presented to assist power and process engineers now making lengthy calculations or inadequate approximations. A chart which may be used to determine horsepower delivered per inch per ply of belting will be presented in the next installment.

A proper belt is described in terms of width, W, and number of plies, P. The product, WP, which represents the ply-inch of fabric in the belt necessary to carry the load, is an important determination. This WP value is determined by dividing the horsepower per inch per ply into the total horsepower (including the starting Service Factor) involved, as in Formula 1 below.

$$WP = \frac{HP \times \text{service factor}}{hp} \quad (1)$$

where

WP = required width-ply product
HP = plate or rated horsepower of the driving unit
hp = horsepower capacity per inch per ply for the fabric selected at the belt speed and angle of belt-contact involved.

Belt speed, S, is determined as follows:

$$S = 0.262 \times D \times rpm \quad (2)$$

where

S = belt speed in feet per minute
rpm = revolutions per minute of the drive pulley
D = diameter of drive pulley in inches

Angle of belt contact is given by

$$A = 180° - \frac{60\,(D - d)}{C} \quad (3)$$

where

D = diameter of the larger pulley in inches
d = diameter of the smaller pulley in inches
C = center-center distance between pulley in inches

This formula gives the smaller angle of belt contact. If an idler is used, it is safe to estimate the belt angle from the position of the idler on the new belt (usually 10° more than calculated above).

TABLE 1—SERVICE FACTORS

	Electric motors										Engines				
	a.c.								d.c.		Gas and diesel				
	Squirrel cage			Synch. single phase											
Applications—	Normal torque line start	Normal torque compensator start	High torque	Wound rotor (slip-ring)	Normal torque	High torque	Repulsion and split-phase	Capacitor	Shunt wound	Compound wound	4 or more cyl. above 700 r.p.m.	4 or more cyl. below 700 r.p.m.	3 or less cyl. (Refer to factory)	Steam	Line shafts and clutch starting
Oil-field machinery:															
Slush pumps									1.4		1.4	1.6		1.4	1.4
Pumping units	1.2	1.2	1.4						1.4						1.6
Pipe-line pumps—centrifugal	1.2	1.2	1.4						1.4	1.4					
Draw works (intermittent)									1.3		1.0	1.0			
Compressors:															
Centrifugal	1.2	1.2		1.4	1.4				1.2		1.2				
Rotary	1.2	1.2		1.4	1.4		1.2	1.2	1.2		1.2				
Reciprocating:															
3 or more cyl.	1.2	1.2		1.4	1.4				1.2						
1 or 2 cyl.	1.4	1.4		1.5	1.5				1.2						
Fans and blowers:															
Centrifugal	1.2	1.2		1.4					1.2		1.2				
Propeller	1.4	1.4	2.0	1.6		2.0			1.4		1.4				
Induced draft	1.2	1.2		1.4					1.4		1.4				
Mine fans	1.6	1.4	2.0			2.0					1.6				
Positive displ. blowers	1.6	1.6		2.0	2.0	2.0					1.6				
Exhausters	1.2	1.2		1.4					1.4					1.5	1.5
Pumps:															
Centrifugal	1.2	1.2	1.4	1.4			1.2	1.2							
Gear	1.2	1.2	1.4	1.4			1.2	1.2							
Rotary	1.2	1.2	1.4	1.4			1.2	1.2	1.2		1.2				
Reciprocating:															
3 or more cyl.	1.2	1.2		1.4	1.4	1.6					1.8			1.8	
1 or 2 cyl.	1.4	1.4		1.6	1.6	1.8					2.0			2.0	
Dredge pumps	1.4	1.4		1.4							2.0			2.0	
Line shafts	1.4	1.4		1.4	1.4	2.0	1.4	1.4	1.4	1.4	1.6			1.6	1.6
Generator & exciters	1.2								1.2		2.0			1.4	1.4

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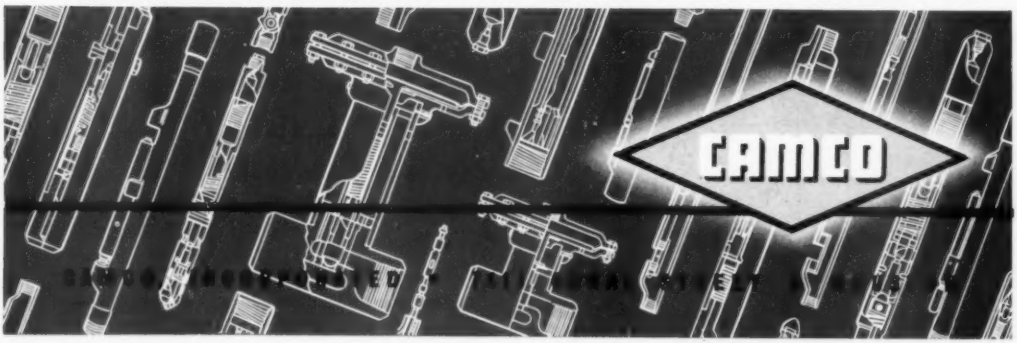

CORROSION CONTROL

Weld Decay in Stainless Steels

THE excellent resistance of the austenitic stainless steels to a wide variety of corrosive media is dependent to a great extent on carbon content and on condition that the structure be properly annealed. Annealing consists in this case of rapid cooling from a temperature of 1,900° to 2,000° F. The greatest damage to corrosion resistance seems to occur when these steels are heated in the range of 700° to 1,500° F.; and the danger of destroying their good properties by this treatment is increased by an increase in the carbon content.

The type of failure which follows this undesirable heat treatment is intergranular attack; the corrosion follows the grain boundaries to such an extent that the steel loses its physical properties without experiencing any great loss in weight. Damage of this nature, before the structure has been weakened enough to fail under service stresses, is not always visible to the eye. It can easily be detected by tensile or ductility tests, and is clearly discernible to microscopic examination. Perhaps the simplest way to detect it in an existing structure is by a hammer test; the metal has a "dead" sound when struck.

Weld Attack

The most common exposure to temperatures in the injurious range occurs when these steels are welded. The weld itself, and some of the metal immediately adjacent thereto, reaches temperatures above 1,500° F., and may cool rapidly enough to be at least partly annealed. The metal at some distance from the weld does not get hot enough to be damaged. But at an intermediate distance, often in a pair of well-defined zones parallel to the weld, the conditions encountered are such as to produce the worst possible effects. Subsequent exposure to a corrosive medium will result in a "rotting" of the metal in two bands parallel to the weld on either side.

The simplest and surest way to overcome the damage done by welding operations is the proper annealing of the structure after welding. This operation may frequently be combined with that of stress relieving, which must be carried out at a higher temperature, but does not in itself require any particular schedule of cooling. But annealing is obviously not applicable to many large structures in which welding is employed as a means of fabrication; for such applications, the remedy must be sought elsewhere.

Influence of Carbon

It has been mentioned that the carbon content has a strong influence on the susceptibility to intergranular corrosion; the phenomenon itself has been attributed to the formation of chromium carbides, thereby lowering the chromium content at or near the grain boundaries; and to the formation of iron carbides, which are themselves subject to attack by relatively mild corrodents. Since it is reasonably clear that carbon is involved in the process, and since it is known from experience that high carbon content increases the probability of the induction of susceptibility by heating, it seems likely that reduction of the carbon content to extremely low values might confer immunity. This has not proved the case, however. For example, 18-8 steel is still subject to intergranular corrosion even when the carbon content is reduced as low as 0.01 per cent.

It might also seem logical that, if chromium depletion is the mechanism by which the damage due to heating occurs, the difficulty could be overcome by increasing the chromium content; this hope, too, has proved illusory; neither 25-12 nor 25-20 steel, even of very low carbon content, is appreciably superior to 18-8 in this respect. However, it has been discovered that the addition of titanium, in the amount of from four to six times the carbon content, will inhibit intergranular corrosion completely; the mechanism is considered to be that of stabilization of the carbides in the steel.

One difficulty involved in the use of titanium, as a stabilizer, is that it does not transfer well from welding rod to the weld; cases have been observed in which the weld itself is attacked. This difficulty was overcome when, shortly after discovery that titanium acted as an effective stabilizer, it was found that columbium performed the same function. It is customarily used, in 18-8 steel, in quantities from 8 to 10 times the carbon content. Columbium has the additional advantage that it transfers in welding without appreciable impoverishment. Steels containing titanium and columbium are completely compatible, so it is possible to use the columbium-bearing 18-8 rod for welding both titanium-stabilized and columbium-stabilized steels.

Maintenance Schedule

The foregoing considerations are useful only in the design and planning of new or replacement structures to take advantage of the corrosion resistance of stainless steels. The problem of what steps to take when intergranular corrosion is encountered in an existing structure is often insoluble. It may, of course, be possible to alter the exposure in such a way as to minimize the attack. In the absence of this possibility, recourse must be had to one or more of the other devices for tolerating a condition for which no fundamental solution is readily available; the establishment of a regular inspection, maintenance, and repair schedule; or the complete replacement of the unit by one more suited to the conditions; or the use of replaceable components; or the installation of properly selected lining materials.

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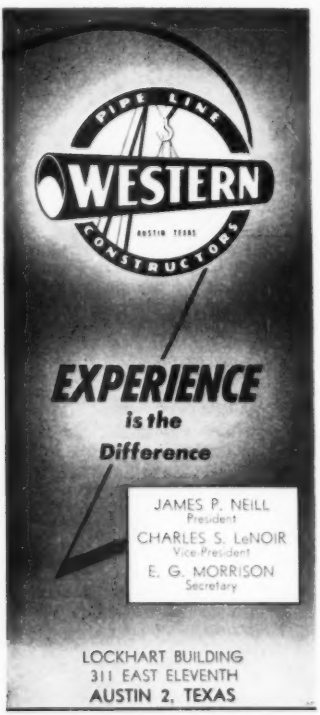


Pipe-Line Construction

FOLLOWING is a tabulation of pipeline projects which are planned or under construction. Included are crude-oil, products, and natural-gas lines. This list is compiled from surveys made by The Oil and Gas Journal.

Crude-Oil Pipe Lines

American Petroleum Co.—30 miles, 6-in., under way, Village Mills to Arriola Field, Hardin County, Texas. J. R. Stewart, contractor. Completion date 5-15-52.

Cities Service Pipe Line Co.—64 miles, 18-in., planned, Sour Lake, Tex., to Lake Charles, La. Completion date 1-1-53.

19 miles, 8-in., under way, Cushing to Guthrie, Okla. Gragg Const. Co. Completion date 6-1-52.

Continental Pipe Line Co.—106 miles, 8-in., contracted, Rincon to northwest of Sullivan City on to Port Isabel, Tex. Completion date 9-30-52.

217 miles, 12-in., authorized, Wichita Falls, Tex., to Ponca City, Okla. Completion date 1953.

Gulf Refining Co.—80 miles, 24-in., proposed, Midland to Colorado City, Tex.

Humble Pipe Line Co.—4, 6, 8, 12-in., proposed, Upton and Reagan counties, Texas.

Interstate Oil Pipe Line Co.—33 miles, 20-in., authorized, Bunkie to Melville, La. Latex Const. of Georgia. Completion date 10-52.

68 miles, 16-in., authorized, Raceland to Anchorage, La. Completion date 10-52.

18 miles, 12-in., authorized, LaRose to Raceland, La. Completion date 10-52.

47 miles, 16-in., authorized, Sunset to Anchorage, La. Completion date 7-52.

Pan American Pipe Line Co.—27 miles, 26-in., planned, Genoa to Texas City, Tex. Completion date 12-52.

40 miles, 14-in., planned, Arden Station in Irion County to Eldorado Station in Schleicher County, Tex. 6-52.

Pasotex Pipe Line Co.—195 miles, 8-in., planned, El Paso to Wink, Tex.

Platte Pipe Line Co.—1,075 miles, 16, 20-in., under way, Worland, Wyo., to Wood River, Ill. Completion date 1952.

573 miles, 16-20-in., under way, Worland, Wyo., to Holdredge, Neb. R. H. Fulton & Co., contractor. A. A. Carrigan, spreadman at Scotts Bluff, Neb.

142 miles, 20-in., under way, Holdredge, Neb., to Kansas State Line, Fulton & Brodie, contractor. J. T. Brodie, spreadman.

Section 7. 274 miles, 20-in., Missouri River to Salisbury, Mo., and Section 8, Salisbury to Mississippi River, under way. O. R. Burden Construction Co. Al Perry, spreadman at Carrolton, Mo.; river crossing field office, Hartford, Ill., Dick Jernigan, spreadman.

Progress Pacific Pipe Line Co.—900 miles, 20-in., proposed, Permian basin, West Texas to California.

Rancho Pipe Line System.—455 miles, 24-in., authorized, McCamey to Houston, Tex. Completion date late 1952. (Joint project with Sinclair Pipe Line Co., Pan American Pipe Line Co., Tidewater Pipe Line Co., Nantucket Pipe Line Co., Phillips Pipe Line Co., and Ashland Pipe Line Co. with Shell Pipe Line Corp. handling construction and operation.

267 miles, contracted, McCamey to Cedar Valley near Austin, Tex. Anderson Bros. Corp.

190 miles, 24-in., contracted, Austin to Shell's Deer Park Refinery (Houston area).

Roosevelt Oil & Refining Corp.—22 miles, 4 and 6-in., authorized, St. Helens to Norwich, Mich.

Service Pipe Line Co.—28 miles, 20-in., looping, authorized; Drumright, Okla., to Humboldt, Kans. G. G. Griffis Const. Co., contractor. E. G. Grisham, spreadman at Drumright.

30 miles, 10-in., proposed, Lea County, New Mexico.

30 miles, 6-in., Knox and Haskell counties, Texas.

29 miles, 4, 6, 8-in., proposed, Natrona County, Wyoming.

Shell Pipe Line Corp.—42 miles, 8-in., authorized, Hallettsville to La Grange, Tex. Completion date 7-1-52.

66 miles, 8-in., authorized, Gohlke to La Grange, Tex. Company crews. Completion date 1952.

Sinclair Pipe Line Co.—674 miles, 22, 24-in., under way, Drumright, Okla., to East Chicago, Ind. Completion date 1953.

Section 1—150 miles, 24-in., under way, Drumright-Cushing, Okla., area, to Humboldt, Kans. O. R. Burden Construction Co.

(Spread 1) 60 miles, 24-in., under way, Caney to Humboldt, Kans. A. B. Haynes, supt., at Chanute, Kans.

(Spread 2) 90 miles, 24-in., under way, Cushing, Okla., to Caney, Kans. Floyd Lewis spreadman at Hominy, Okla.

184 miles, 24-in., under way, Humboldt, Kans., to Salisbury, Missouri. R. H. Fulton & Co., contractor, M. L. Boyd and Jerry Nash, spreadmen.

Sterling Pipe Line System.—53 miles, 12-in., authorized, Sterling, Colo., to connection with Platte Pipe Line at Gurley, Neb. (includes 20 miles, 10-in., main line; 35 miles, 6-in., branch lines.) Joint venture comprising Toronto Pipe Line Co., Shell Pipe Line Corp., and Texas Pipe Line Co.

Sun Pipe Line Co.—99 miles, 4, 6, 8-in., proposed, Scurry County, Tex.

34 miles, 8-in., planned, Jameson to Colorado City, Tex.

13 miles, planned, Cogdell to Brice Island.

Texas Pipe Line Co.—319 miles, 22, 12, 10-in., under way, Louisiana Gulf Coast to Port Arthur, Tex., including 220 miles, 22-in., Houma, La., to Port Arthur, Tex.; 31 miles, 12¾-in., Houma to Cocodrie, La. Houston Contracting Corp. Completion date in summer 1952.

175 miles, 16-in., under way, Corsicana to East Houston. Smith Contracting Corp. Frank Craig, spreadman at Teague, Tex. Completion early summer.

319 miles, 22, 12, 10-in., under way, Louisiana Gulf Coast to Port Arthur, Tex. Houston Contracting Co.

220 miles, 22-in., under way, Houma, La., to Port Arthur, Tex. Houston Contracting Co.

67 miles, 22-in., under way, Holmwood, La., west to Port Arthur, Tex. Houston Contracting Co., E. C. Norris, superintendent at Lake Charles, La.

67 miles, 22-in., under way, Holmwood east to Gueydan, La., and from Morgan City east to Houma. Houston Contracting. W. H. Hayes, superintendent, at Jennings, La.

86 miles, 22-in., under way, Gueydan east to Morgan City, La. Houston Contracting. F. A. Silar, superintendent, at Abbeville, La.

65 miles, 6, 8, 10-in., under way, and 30 miles, 12-in., Houma, La., south through Terrebonne Bay vicinity. Houston Contracting. H. L. Leake, superintendent, at Houma.

West Texas Gulf Pipe Line Co.—471 miles, 26-in., contracted, Colorado City to Wortham, Tex., Wortham to Sour Lake, Tex., 24-in. Completion date 10-52.

114 miles, 20-in., contracted, Wortham to Longview, Tex. Completion date 10-52.

44 miles, 26-in., under way, Glenrose, Tex., area. Anderson Brothers, contractor.

120 miles, 26-in., contracted, East of Abilene, Tex. Associated Pipe Line Contractors, Inc.

60 miles, 26-in., contracted, Colorado City to Abilene, Tex. Anderson Bros. Corp.

94 miles, 26-in., contracted, West of Wortham, Tex. Anderson Bros.

Products Pipe Lines

Bell Oil & Gas Co.—150 miles, 6-in.,

planned, Ardmore to Drumright, Okla. (Includes 114 miles, 8-in., 33 miles, 6-in.)

Buckeye Pipe Line Co.—370 miles, 8, 12, 16-in., authorized, Linden, N. J., via Allentown, Pa., to Auburn, Syracuse, Waterloo, and Rochester, N. Y. (Sections divided as follows: 75 miles, 16-in., 218 miles, 12-in., 77 miles, 8-in.). Completion of 16-in., 1952, balance 1953.

8 miles, 12-in., authorized, looping Samaria to Earhart, Mich.

15 miles, 12-in., authorized, looping Sylvania, Ohio southward.

Coastal Products Pipe Line Co.—260 miles, 20-in., proposed, Houston to Baton Rouge.

Ohio Oil Co.—255 miles, 8, 10-in., proposed, East St. Louis, Ill., to Indianapolis.

34 miles, 8-in., authorized, East St. Louis to Wood River, Ill.

Phillips Oil Co.—28 miles, 12-in., authorized. Sweeny to Freeport, Tex. Completion date 3-52.

Phillips Pipe Line Co.—42 miles, 10-in., under way, Green Ridge to Villa Ridge, Mo. Mid-States Const. Co. T. H. Edmonds, superintendent at Sedalia, Mo.

68 miles, 12¾-in., under way. Osawatomie westward to Wichita, Kans. Brown Lite Co. R. E. Carriker, spreadman at Osawatomie, Kans.

40 miles, 10-in., through Monteau, Cole, Osage, and Gasconade counties, Missouri, Trojan Const. Co. E. L. Maggard, spreadman at Linn, Mo.

Under way, Paloa, Kans.-Harrisonville, Mo. Smith Contracting Corp.

74 miles, 8-in., under way, looping from Decatur, Ill., to East Chicago, Ind. Somerville Const. Co., contractor.

137 miles, 10-in., authorized, looping from Paola, Kans., to East St. Louis, Ill.

Pioneer Pipe Line Co.—(Continental Pipe Line Co. and Sinclair Pipe Line Co.). 310 miles, 8-in., proposed, Sinclair, Wyo., to Salt Lake City, Utah.

Progress Pacific Pipe Line Co.—900 miles, 10-in., proposed, California to West Texas.

Salt Lake Pipe Line Co.—Proposed, Pasco, Wash., to Puget Sound.

Shell Oil Co.—365 miles, 8-14-in., planned. Wood River via East Chicago to Detroit; 35 miles, 14-in. Completion date summer of 1952.

Sinclair Pipe Line Co.—10-in., Houston to Baton Rouge; 16-in., Kalamazoo to Detroit; 20-in., Marcus Hook to Bayonne, N. J.; East Chicago to South Bend, Ind.

8-10-in., planned, Sinco to Port Arthur, Tex.

Standard Oil Co. (Ind.).—316 miles, 12-in., proposed, Sugar Creek refinery to Dubuque, Iowa.

122 miles, 8-in., under way, Neodesha, Kans., to Belton, Mo. Bills & Tuoth Construction Co., Carl Bills, superintendent, at Armory Building, Neodesha. Completion date 1952.

Standard Oil Co. (Ohio).—17 miles, 6-in., authorized, Toledo to West Toledo, Ohio.

Susquehanna Pipe Line Co.—123 miles, 6, 8-in., proposed, Fostoria to Randolph, Ohio.

United States Pipe Line Co.—1,000 miles, proposed, Gulf Coast via Memphis, Nashville, Tenn., Lexington, and Paducah, Ky., to Cincinnati, Ohio.

Natural-Gas Pipe Lines

Algonquin Gas Transmission Co.—140 miles, 24-26-in., under way, New Jersey to Connecticut River near New Haven. Williams Brothers, contractor. Completion date 8-1-52.

Allied Gas Co.—24 miles, 6⅝-in., proposed, McLean to Champaign County, Illinois.

Arkansas-Missouri Power Co.—140 miles, 2-10-in. planned. Arkansas and Missouri.

Associated Natural Gas Co.—88 miles, authorized, Missouri.

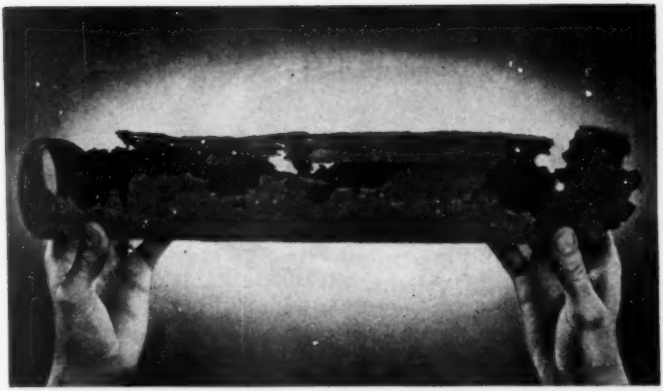
Carolina Natural Gas Corp.—185 miles, 2-12-in., proposed, lateral lines off Transcontinental in North and South Carolina.

Cities Service Gas Co.—179 miles, 4-30-in., gathering system in vicinity of Ulysses, Kans. Vaughn & Taylor Const. Co., Inc. D. D. Vaughn, spreadman, Ulysses.

21 miles, 26-in., proposed, Franklin and Anderson counties, Kansas.

15 miles, 20-in., Craig County, Oklahoma, to Lawrence County, Missouri.

Coast Counties Gas & Electric Co.—40



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miles, 3, 4, and 8-in., planned. Coast and Valley region, California.

Colorado Interstate Gas Co.—250 miles, 20-in., under way, Kit Carson, Colo., to Amarillo, Tex. R. H. Fulton & Co., contractor. Jerry Nash, spreadman at Lamar, Colo.

16 miles, 4-in., Pueblo County to Fowler, Colo.

Commonwealth Natural Gas Corp.—537 miles, 20-in., proposed, West Bend, Ky., to Norfolk, Va.

Cumberland & Allegheny Gas Co.—46 miles, 10-in., authorized, Mountain Lake Park, Md., to Preston County, West Virginia.

Dow Chemical Co.—70 miles, various sizes, Midland, Saginaw, and Bay City, Mich. Mahoney Contracting Co., contractor. Ralph Bucher, spreadman at Midland.

East Tennessee Natural Gas Co.—172 miles, 22-in., authorized, Greenbrier to Oak Ridge, Tenn.

100 miles, 16-in., proposed, Knoxville to Kingsport, Tenn.

El Paso Natural Gas Co.—133 miles, 30-in., proposed, looping along main line in Texas, New Mexico, Arizona.

36 miles, 24-in., proposed, looping from Kingman to Franconia, Ariz.

Equitable Gas Co.—17 miles, 16-in., under way, near Pittsburgh, H. L. Gentry Const. Co., contractor. Lavern Curtis, spreadman at Sewickley, Pa.

Georgia Gas Co.—32 miles, 4½-in., proposed, Bogart to Gainesville, Ga.

Glacier Gas Co.—285 miles, 20-in., proposed, Kalispell, Mont., to Spokane, Wash.

120 miles, 16-in., proposed, Spokane to Hanford, Wash.

91 miles, 8⅝-in., proposed, Spokane to Lewiston, Idaho.

130 miles, 12¾-in., proposed, Spokane to International boundary at Trail, British Columbia.

Grand Valley Pipe Line Co.—105 miles, 8-10-in., planned, Piceance Creek field to Rifle on to Grand Junction, Colo.

Gulf Interstate Gas Co.—1,000 miles, 30-in., planned, Gulf Coast to North Kentucky.

Home Gas Co.—32 miles, proposed, Chemung and Broome counties, New York.

17 miles, 12-in., proposed, loops from Hancock to Sanford, N. Y.

Iowa-Illinois Gas & Electric Co.—41 miles, 10-in., authorized, Washington County to Cedar Rapids, Iowa.

⅜ to 6-in., under way, Davenport, Iowa, and Moline, Ill. C. E. Wilson Const. Co.

Kansas-Nebraska Natural Gas Co., Inc.—179 miles, proposed, Kansas and Nebraska.

20 miles, 16-12-in., planned, Hastings to Grand Island, Neb. Completed date 1952.

18 miles, 6-8-in., planned, McCook Neb., south. Completion date 1952.

54 miles, 4-6-in., planned, Neligh to Hartington, Neb. Completion date 1953.

49 miles, 10-in., planned, Ogallala to North Platte, Neb. Completion date 1952.

20 miles, 12-in., planned, Atwood to near Oakley, Kans. Completion date 1952.

Kansas Power & Light Co.—27 miles, 20-in., authorized. Pratt, Kans., to Calista compressor station.

28 miles, 12-16-in., planned, north of Kansas to Meade County Gas Field.

Lake Shore Pipe Line Co.—45 miles, 10¾-in., authorized, northwesterly from T.G.T. system near Meadville, Pa., to Ashtabula, Ohio.

Lone Star Gas Co.—100 miles, proposed, storage fields to the Dallas-Fort Worth area.

5 miles, 12-in., proposed, southeastern Schleicher County.

Manufacturers Gas Light & Heat Co.—40 miles, proposed, Allegheny, Washington, and Beaver counties, Pennsylvania.

Michigan Gas Storage Co.—93 miles, 16, 22, 24-in., under way, Laingsburg to near Pontiac and Mount Clemens, Mich. (Includes 17 miles of lateral lines.) Mahoney Contractor. Completion date 6-52.

30 miles, 26-in., authorized, looping between Laingsburg and Mount Pleasant Junction, Mich.

Michigan Gas Utilities Co.—77 miles, under way, Sturgis, Hillsdale, and Coldwater, Mich. (22.7 miles, Marshall south to Coldwater; 20 miles, Coldwater easterly to Hillsdale; 22.5 miles, Hillsdale to Sturgis, 11 miles, Hillsdale to Jonesville.) Somerville

Const., contractor. Jim Godwin at Coldwater.

MidSouth Gas Co.—240 miles, proposed, Greene, Poinsett, Crittenden, St. Francis, Lee, Phillips, Monroe, Woodruff, and Cross counties, Arkansas.

Mississippi River Fuel Corp.—98 miles, 16- and 18-in., authorized, feeder line from Lincoln Parish, Louisiana, to Waskom field, Harrison County, Texas.

40 miles, 18-in., authorized, Dubach to Perryville, La.

Missouri Central Gas Co.—25 miles, 6-in., contracted, Moberly to Macon, Mo. L. R. Young Const. Co.

Montana Power Co.—52 miles, 16-in., authorized, Canada-Montana border to Cut Bank, Mont.

National Utilities Co. of Michigan.—76.7 miles, 20-in., proposed, South Central Michigan. (22 miles from near Marshall south to Coldwater; 20 miles east to Hillsdale; 22 miles southwest to Sturgis; 5 miles from Hillsdale to Jonesville and 8 miles west to Union City.)

Nevada Natural Gas Pipe Line Co.—114 miles, 10-in., proposed, Topock, Ariz., to Las Vegas, Nev.

New River Gas Co.—50 miles, planned, Summers to Monroe counties, West Virginia to Narrows and Dublin, W. Va.

New York State Natural Gas Corp.—104 miles, 14, 16, 20-in., authorized, looping on Westmoreland, Armstrong, and Tioga counties, Pennsylvania. (Includes 17 miles, 16-in., in Potter County, Pennsylvania, and 21 miles 14-in., replacement in Line No. 507, New York.)

12 miles, 20-in., under way, looping at Zelienople, Penn. Williams-Austin Co. Ralph Gaddy, supt. 5-15-52.

52 miles, 16-in., contracted, Utica to Amsterdam, N. Y. (to begin at completion of Zelienople). Williams Austin. Ralph Gaddy, supt. Completion in 90 days.

20 miles, 20-in., begin 5-1, Cayuta Gate to Ithaca, N. Y. Williams-Austin Co. Howard Bauer, supt. Completion date 6-30-52.

30 miles, 20-in., contracted, Angelica to Rossburg, N. Y. (begin at completion of Cayuta-Ithaca). Williams-Austin. Howard Bauer, supt. Completion in 45 days.

17 miles, 16-in., contracted, Colesburg Junction to Sabinsville, Pa. (begin at completion of Angelica job). Williams-Austin. Howard Bauer, supt.

21 miles, Columbiana and Stark counties, Ohio.

Niagara Mohawk Power Corp.—55 miles, 10-in., Fulton to Watertown, N. Y.; Williams-Austin Co., contractor, Howard Bauer, supt. Completion date 9-52.

Northeastern Gas Transmission Co.—221 miles, 20-24-in., authorized, New Hampshire, Massachusetts, and Connecticut.

Northeastern Gas Co.—411 miles, proposed, New England towns.

Northern Natural Gas Co.—580 miles, proposed, Kansas, Texas, Oklahoma, and Nebraska loops.

210 miles, 26-in., proposed, five loops in Texas-Oklahoma area, two in Kansas, and two in Nebraska.

400 miles, 24-in., proposed, Emerson, Manitoba south to Red River Valley through Fergus Falls on to St. Paul, Minn.

Northern Indiana Fuel & Light Co.—33 miles, 8-in., proposed, Edgerton to Auburn, Ind.

Northwest Natural Gas Co.—750 miles, planned, Washington, Oregon, and Idaho.

373 miles, 24-in., proposed, Eastport, Idaho, to Monroe, Wash.

79 miles, 18-in., proposed, Monroe to International boundary near Lynden, Wash.

29 miles, 22-in., proposed, Monroe to near Seattle, Wash.

164 miles, 20-in., proposed, Seattle to Portland, Ore.

Ohio Fuel Gas Co.—31 miles, 20-in. authorized, Licking County to Richland County, Ohio.

22 miles, 16-in., authorized, Dayton, Troy, Piqua, and Sidney, Ohio.

23 miles, 16-20-in., authorized, Wellington to Elyria, Ohio; 16 miles, 20-in., authorized, Benton Station to Crawford Station. 18 miles, 20-in., Crawford Station to near Columbus. 16 miles, 16-in., authorized, Berlin to Sandusky, Ohio.

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71 miles, 3 to 20-in., authorized, Hocking, Knox, and Ashland counties, Ohio.

47 miles, 20-in., authorized, Benton Township, Hocking County, to Columbus, Ohio.

61 miles, authorized, northern and southwestern Ohio.

33 miles, 20-in., proposed, Jefferson to Seneca, Ohio.

Pacific Gas & Electric Co.—44 miles, 8-in. under way, Salinas to King City, Calif. W. A. Tyler, contractor. Completion date 1952.

141 miles, 34-in., proposed, parallel sections along Topock-Milpitas line.

10 miles, 10-12-in., authorized, Monterey to Fort Ord to Castroville; 12 miles, 16-in., Napa Wye to Shellville; 6 miles, 12-in., Cotati to Santa Rosa, Calif.

Pacific Northwest Pipeline Corp.—26-in. Alberta fields through to Pincher Creek, Spokane, Hanford, Vancouver, and Portland.

Panhandle Eastern Pipe Line Co.—70 miles, 24-26-in., under way, looping from Sneed, Tex., to Emporia, Kans.

174 miles, 30 and 26-in., contracted. Tuscola, Ill., eastward—looping present system; R. A. Conyes, contractor. 44 miles, 26-in., Edgerton, Mich.; Anderson Bros.; 22 miles, 30-in., looping in Tuscola, Ill.; 45 miles, 30-in., looping in Montezuma, Ind.; 63 miles, 30-in., looping in Zionsville, Ind.

Pennsylvanian Gas Co.—52 miles, 12-in., between Warren and Erie, Pa. Section 1—27 miles, under way and contracted by Harford Bros. Section 2—25 miles.

Peoples Natural Gas Co.—25 miles, proposed, Cambria and Blair counties, Pennsylvania.

Permian Basin Pipeline Co.—384 miles, 20-30-in., proposed, Permian Basin area to eastern New Mexico.

139 miles, planned, Upton County, Texas, to Lea County, New Mexico.

76 miles, planned, Lea County to Roosevelt County, New Mexico.

169 miles, planned, Roosevelt County, New Mexico, to Carson County, Texas.

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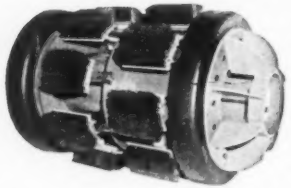
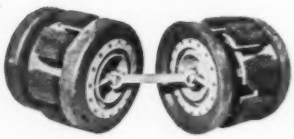
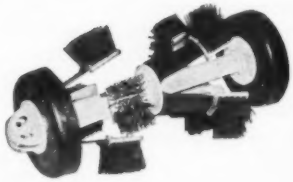


GP-2 16"-30"
Similar design 10" to 14" sizes. Will traverse all standard pipe-line gate valves and field bends of approx. 12 ft. radius.



GP-3 18"-30"
Similar design 10" to 16" sizes. Will traverse long-radius welding ells up to 90° lengths. Also through port and many conventional gate valves.

WC-12 6"-14"
Will traverse all standard pipe-line gate valves and field bends.



Other designs for sizes smaller than 6"

REPRESENTATIVES

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TULSA 9, OKLAHOMA

Phillips Petroleum Co.—118 miles, 3-22-in., under way, Sherman and Hansford counties, Texas, gas-gathering system; Vaughn & Taylor Construction Co., Inc., Dumas, Tex., J. F. Crawford, spreadman at Texhoma, Okla.

Prince George's Gas Corp.—20 miles, 22-in., authorized, between Chillum and Rockville, Md.

Public Service Co. of Colorado.—95 miles, proposed, Douglas Creek and other gas fields to Grand Junction, Colo., area.

Public Service Co. of North Carolina.—33 miles, 10-in., authorized, Burlington to Chapel Hill, N. C.

16 miles, 8-in., authorized, Chapel Hill to Raleigh, N. C., completion date 7-1-52.

29 miles, 4-in., authorized, Statesville to Kanapolis, N. C., completion date 7-1-52.

83 miles, 8-in., authorized, Kings Mountain to Asheville, N. C., completion date 3-1-53.

Rockland Light & Power Co.—22 miles, 8-in., proposed, Orangetown to Tompkins Cove, N. Y.

South Georgia Natural Gas Co.—339 miles, 2-12-in., proposed, Florida and Georgia.

Southern California Gas Co.—35 miles, planned, Antelope Valley, California.

Southern California Gas Co. and Southern Counties Gas Co. of California.—45 miles, 30 in., proposed, looping on line from Arizona border to Los Angeles.

81 miles, 30-in., proposed, Whitewater to Desert Center, Calif.

Southern Natural Gas Co.—21 miles, 24-in., authorized, Perryville Station La., to Boeuf River.

14 miles, 24-in., authorized, Onward Station, Miss., to Big Sunflower River.

14 miles, 14-in., authorized, Perryville Station, La., to Wilhite Gate.

375 miles, 24-in., planned, Gwinville, Miss., to Atlanta, Ga.

169 miles, proposed loops, Ouachita Parish, Louisiana, to Augusta, Ga.; 30 miles in Ouachita Parish, 33 miles in Ouachita and West Carroll parishes; 7 miles, Sharkey County, Mississippi; and 108 miles, 14-in., Bass Junction to Augusta, Ga.

Southern Union Gas Co.—21 miles, 20-in., authorized, Albuquerque, N. M.

27 miles, 10-in., authorized, Lea and Eddy counties, New Mexico.

30 miles, 12-20-in., contracted, San Juan County, New Mexico. R. H. Fulton & Co.

Southwest Gas Corp., Ltd.—26 miles, proposed, from P.G.&E. line to Victorville, Calif.

Sunray Oil Corp.—133 miles, 3-30-in., under way, system for Snyder gasoline plant. Vaughn & Taylor Construction Co., contractor. D. D. Vaughn, spreadman.

Tennessee Gas Transmission Co.—591 miles, 24-30-in., proposed, looping along present system (consisting of 323 miles of 30-in.; 167 miles of 26-in.; 101 miles of 24-in.)

420 miles, 30-in., Texas, Louisiana, Arkansas, Mississippi, Tennessee, and Kentucky.

101 miles, 26-in., Kentucky and Ohio.

304 miles, 24-in., proposed, Mercer, Pa., to Utica, N. Y.

250 miles, miscellaneous laterals.

Texas Eastern Transmission Corp.—791 miles, 30-in., under way, Kosciusko, Miss., to Connellsville, Pa.

Section 8, 77 miles, 30-in., under way, Portsmouth to Amesville, Ohio. Anderson Bros. Corp.

Section 9, 74 miles, 30-in., under way, Amesville to Ohio-West Virginia river crossing. Anderson Bros. Corp.

Section 10, 66 miles, 30-in., under way, Ohio River to Connellsville, Pa. Anderson Bros Corp.

Texas Gas Transmission Corp.—406 miles, 26-in., proposed, looping from Bastrop to Hardinsburg, Ky.

223 miles, 26-in., proposed, Bastrop, La., to Covington, Tenn.

47 miles, 26-in., proposed, northeastward from Covington.

49 miles, 26-in., proposed, northeastward from Kenton, Tenn.

45 miles, 26-in., proposed, northeastward from Calvert City, Ky.

25 miles, 26-in. proposed, northeastward from Slaughters, Ky.

19 miles, 26-in., proposed, southwestward from Jeffersontown, Ky.

180 miles, 26-in., authorized, Acadia Parish

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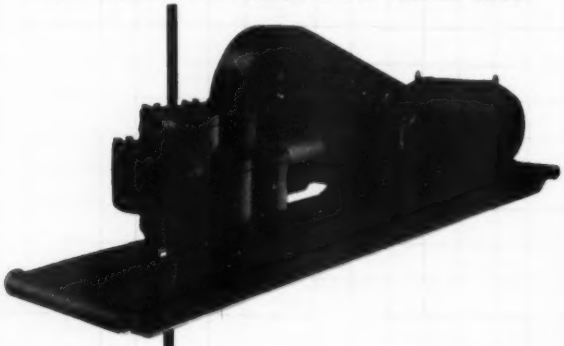

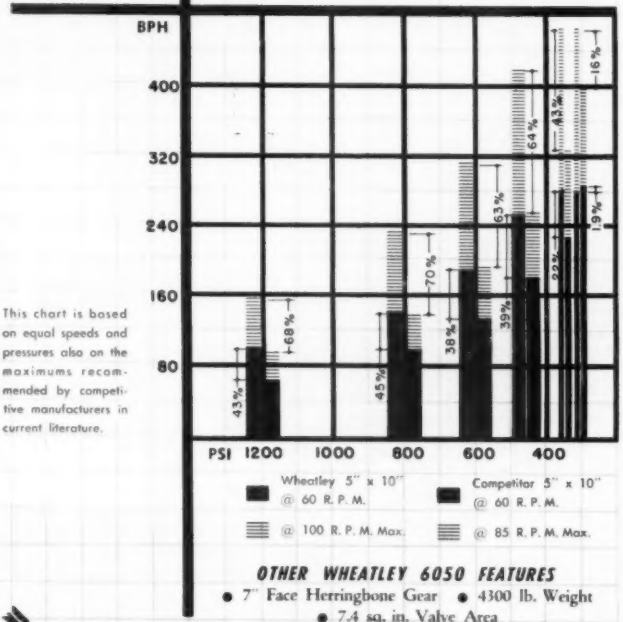

This chart is based on equal speeds and pressures also on the maximums recommended by competitive manufacturers in current literature.

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35 miles, 12-in., authorized, Slaughters, Ky., to Evansville, Ind.

195 miles, 26-in., proposed, Gulf Coast region to southwestern Louisiana.

560 miles, 36-in., proposed, Louisiana and Kentucky.

Texas-Ohio Gas Co.—1,350 miles, 30-in., proposed, Hidalgo County, Texas, through Arkansas, Mississippi, Tennessee, and Kentucky on to Spencer, W. Va. Completion date 6-30-53.

Union Oil Co. of California.—40 miles, 8-10-in., planned, San Joaquin Valley and Los Angeles basin.

United Fuel Gas Co.—32 miles, 20-in., under way, Lanham to Broad Run, W. Va. H. L. Gentry Construction Co., contractor. Frank Morris, spreadman at Charleston, W. Va.

United Gas Pipe Line Corp.—315 miles, 24-30-in., under way, Agua Dulce to near Goodrich, Tex. Oklahoma Contracting Co., contractor. Panama Shiflett, spreadman, El Campo, Tex.; Ray Law, spreadman, Victoria, Tex.

510 miles, 20 to 30-in., under way, Agua Dulce, Tex., to Monroe, La. River Const. Corp., contractor.

Spread 1, 51 miles, 30-in., from Pearl River north and south of Jackson, Miss. Red Tatom, superintendent at Jackson.

Spread 2, 45 miles, 30-in., McComb to Pearl River south of Jackson. Merle Tatom, superintendent at Hazelhurst.

Spread 3, 30 miles, 30-in., Kosciusko south toward Jackson. Jimmy Reed, superintendent at Kosciusko.

Spread 4, 29 miles, 12-in., Lafayette to Jeanerette, La. Roy Earnhart, spreadman at Jeanerette.

Spread 6 and 7, 97 miles, 20-24-26-in., under way, Houston to Dupont's Sabine River Works, Orange, Tex. Barney Hall, superintendent at Port Arthur.

Spread 6, 20 miles, 20-in., under way, Orange to Port Neches, Tex. (This spread to move on to Trinity River and work toward Houston.) Banty Traweek, spreadman.

Spread 7, 20-26-in., under way, Port Neches to Fannett, Tex. (This spread will continue on to Trinity River.) Borger Red McMenamy, spreadman.

124 miles, Sterlington compressor station, near Monroe to Jackson, Miss.

23 miles, 8-12-16-in., South Louisiana facilities.

53 miles, 24-in., authorized, Texas.

50 miles, 16-in., authorized, Baldwin County, Alabama, southeasterly to Escambia County, Florida.

36 miles, proposed, offshore from Ingleside to near Refugio, Tex.

All contracted by River Const. Corp., a joint venture including Oklahoma Contracting Co.; J. Ray McDermott & Co., Inc., and Morrison-Knudson. Inspection by Brown & Root, Inc.

Virginia Natural Gas Co.—133 miles, Buckingham to Richmond and Portsmouth, Va.

Western Kentucky Gas Co.—2 to 4-in., under way, additions to present system; Modern Welding Co., Inc., contractor.

Western Pipe Lines.—1,200 miles, 22-in., planned, southern Alberta to Duluth, Minn.

West Texas Gas Co.—27 miles, 10-in., authorized, Lubbock to Abernathy, Tex.

Foreign Crude-Oil Pipe Lines—Planned and Under Way

Alberta-Vancouver Oil Pipe Line Co.—(Brokaw, Dixon, McKee).—972 miles, 16-in., proposed, Edmonton via Pincher Creek, Alta., Idaho and Washington states to Vancouver, B. C.

Cia. de Petroleo Ganso Azul, Ltd.—48 miles, 4-in., planned, Ganso Azul field to Pucalpa on upper Ucayali River, Peru.

Condor.—90 miles, 12-in., under way, Genoa to Rho, near Milan, Italy. Soc. Ital Condotte Acqua Montubi, contractor. Completion date 7-31-52.

Creole Petroleum Corp.—143 miles, 26-in., under way, Ule (State of Zulia) to Amuay (State of Falcon) William Bros. Corp. Completion date March 1953.

25 miles, 34-in., authorized, Lagunillas to La Salina (State of Zulia). Completion date April 1953.

Direccion General de Yacimientos Petroliferos Fiscales.—409 miles, under way, Plaza Huincul to Bahia Blanca, Argentina.

Interprovincial Pipe Line Co.—100 miles, 16-in., contracted, Regina, Sask., to Gretna, Man., Canada. Anderson International Contractors, Ltd.

Iraq Government.—135 miles, 12-in., proposed, from Iraq Petroleum Co. at Baija to Baghdad, Iraq. Construction 1952, M. W Kellogg, contractor.

72 miles, 12¾-in., Zubair to Fao. Arabian Bechtel Co., contractor.

Kuwait Oil Co., Ltd.—10 miles, 20-in., authorized, third transit line Burgan-Ahmadi Completion date 2-52. 6 miles, 30-in., authorized, sixth gravity loading line, Ahmadi-Mina al Ahmadi. Completion date 6-52 5 miles, 16-20-in., authorized, Burgan field —oil collecting line. 2-52.

Middle East Pipelines, Ltd.—800 miles, 34-35-in., planned, Iran to a Levantine port.

Petroleos Mexicanos.—145 miles, 12-in., considered, 18 de Marzo field via Reynosa to Monterrey, Mexico.

100 miles, planned, Isthmus of Tehuantepec, Jose Colomo to El Plan field, Minatitlan.

Spitz & O'Berine.—264 miles, 24-in., under way, Capetown to Tarrytown, South Africa. J. C. Spitzexplari, spreadman at Capetown.

Texas Petroleum Co.—60 miles, 4-6-in. under way, Pto. Nino to La Dorada.

Trans-Mountain Oil Pipe Line Co.—639 miles, 24-in., proposed, Edmonton, Alta., to Vancouver, B. C. Canadian Bechtel, Ltd., engineers.

221 miles, 24-in., contracted, center section of line, Mannix, Ltd.

472 miles, 24-in., contracted, Western section of line, Comstock Midwestern, Ltd.

Foreign Products Pipe Lines—Planned and Under Way

Colombia Ministry of Petroleum.—90 miles 6-in., planned, Puerto Berrio to La Dorada. Colombia.

113 miles, 6-in., contracted, Puerto Berrio to Acededo near Medellin, Colombia. Carolina Construction Co.

75 miles, 4-in., planned, Buena Venturs to Cali, Colombia.

Empresa de Ferrocarriles Ecuatorianos.—50 miles, 6-in., contracted, Guayaquil to Palmira, Ecuador. J. A. Jones, contractor; C.R.C. Engineering Co., engineers.

Estrada de Ferro Santos a Jundiai.—32 miles, 18-in., under way, Santos to Sao Paulo, Brazil ((fuel oil line); Techint, contractor. Completion date 12-51.

Governments of Southern Rhodesia and Portuguese East Africa.—200 miles, considered, Beria, Portuguese Mozambique to Umtali, Southern Rhodesia.

Imperial Oil Co., Ltd.—170 miles, 10-12-in., under way, Hamilton to Toronto, Ont., Canada, Comstock-Midwestern, Ltd., contractor. Completion date July 1952.

Petrocongo (Sub. Cie. Financiere Belge des Petroles, S.A.).—225 miles, considered, Ango-Ango to Leopoldville, Belgian Congo.

Societe des Transports Petroliers par Pipe Line.—140 miles, 10-in., under way, Le Havre to Paris, Fance. Entrepose, contractor. Completion date 1952.

State of Cundinamarca, Colombia.—120 miles, 6-in., Puerto Salgar to Bogota, Colombia; Williams Brothers Co.; David Louthen, manager, Bogota.

Trans-Northern Pipe Line Co.—440 miles, under way, Hamilton, Ont., to Toronto, Ont., to Montreal, Que., Canada.

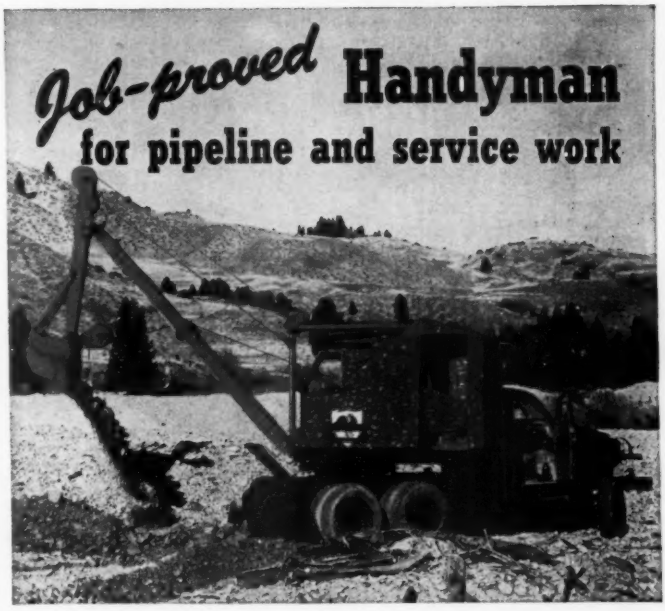
Foreign Natural-Gas Pipe Lines—Planned and Under Way

Azienda Generale Italiana Petroli.—110 miles, 12-14-16-in., planned, Cortemaggiore to Genoa.

143 miles, 14-16-in., under way, Cortemaggorie to Torino. Completion date 1951.

Canadian Delhi Oil Co. (Subsidiary Delhi Oil Co.).—2,132 miles, proposed, Alberta, Toronto, Montreal.

Direccion General del Gas del Estado.—310 miles, 8-in., under way, Plaza Huincul to Neuquen, Argentina, to the vicinity of General Conesa, Argentina.



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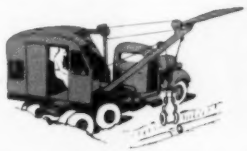

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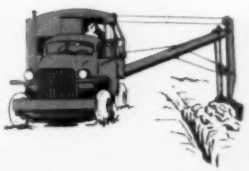

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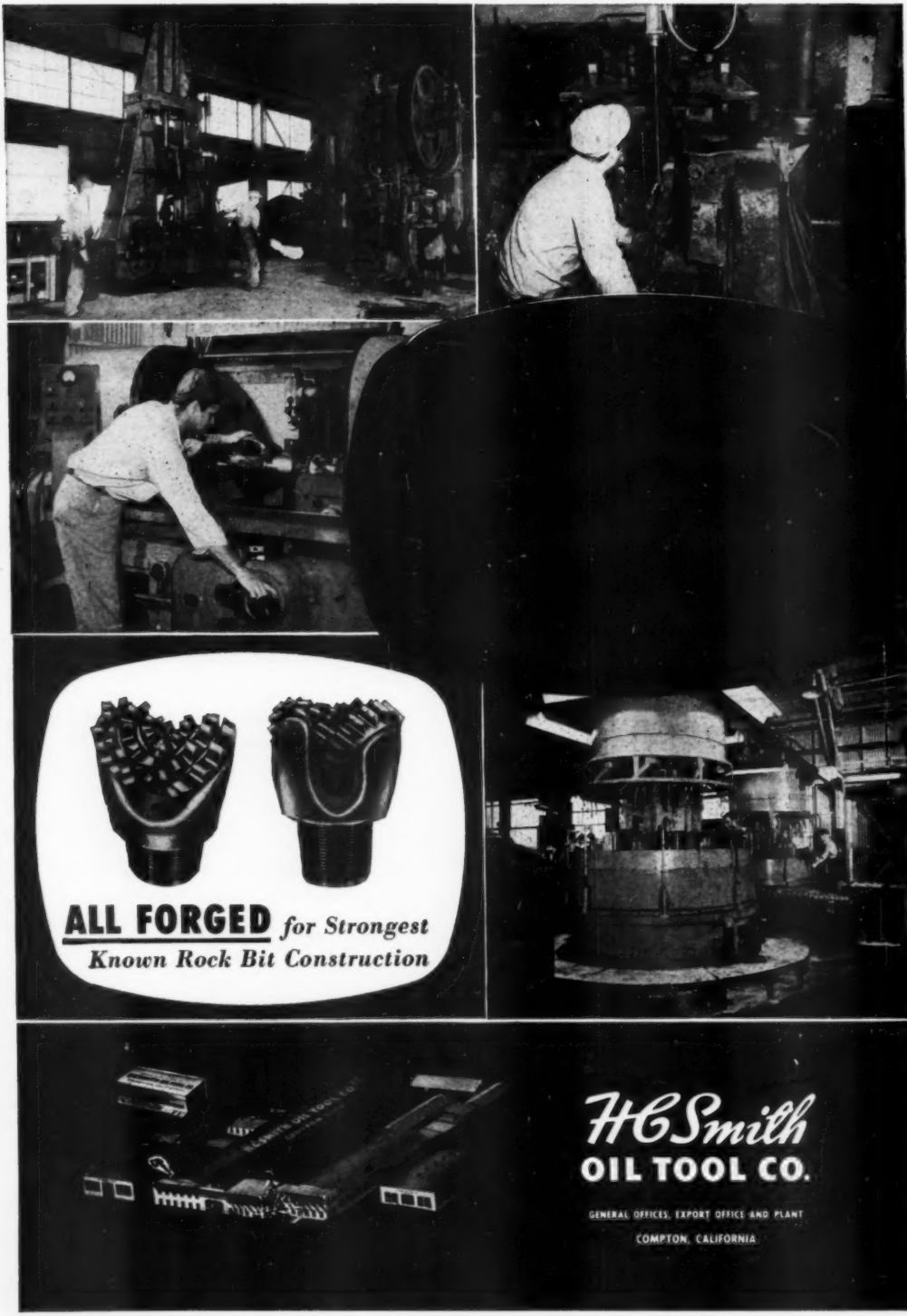
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Among the Drilling Contractors

Tulsa Contractors Hear Gulf Executive

Floyd E. Hatfield, executive assistant to the vice president of Fort Worth division, Gulf Oil Corp., discussed "Oil in Kuwait and the Persian Gulf" at a luncheon of the Tulsa chapter of the American Association of Oilwell Drilling Contractors April 14.

Crude oil production from the Persian Gulf area now amounting to 1,900,000 bbl. daily comes from approximately 350 wells, he pointed out. The loss of production from Iranian fields has been offset by increased production from other Middle East fields. The capacity of the Anglo-Iranian refinery at Abadan which has been lost by shutdown will be offset by new refining facilities in Europe which will be completed in 1953.

New Illinois Contractors

Jack Houchins, formerly tool pusher for George & Wrather Drilling Co., Mount Carmel, Ill., and Steve Sawyer, formerly with National Supply Co. at Grayville, Ill., have organized a new rotary contracting firm to operate in the Illinois basin area. The new firm is known as H & S Drilling Co. Main office is located at Mount Carmel.

Montgomery Drilling Co., El Dorado, Ark., has moved a rotary rig to the Point area in southeastern Union Parish, Louisiana, where it has a contract for a 5,000-ft. Travis Peak test to be drilled for D. M. Love and associates at 1 H. B. Albritton, N½ SW NW NW 17-19n-2e. Location is nearly a mile southeast of a gas-discovery well recently completed by Southwest Gas Producing Co., and is the first confirmation test for the area. The discovery well produces from Travis Peak at 4,909-32 ft.

Crow Drilling Co., Inc., Shreveport, as contractor and part owner with Sam Sklar, is starting a Pettit sand test for the old Shreveport field, Caddo Parish, northwestern Louisiana. Location is for 1 Ellerbe, in 28-18n-14w. It is in the west end of the field and more than a half mile from the nearest well.

Greyhound Drilling Co., Inc., El Dorado, Ark., is the contractor on a newly started deep test being drilled for Cryer & Halbouty in the old shallow producing area of the Pine Island field, Caddo Parish, northwestern Louisiana. The new operation, 2 Muslow, in 9-20n-15w, is 3 miles west of the Rockpoint field, where the contractor has another rig working on a partnership operation with M. T. Halbouty, one of the above operators.

New Kansas Drilling Firm

Saturn Drilling, Inc., is a newly formed drilling firm now operating in Kansas. John W. McKnab, Wichita, is president and general manager. J. A. Shackelford, tool pusher, is located at Great Bend.

Illinois Drillers Move

Merle Eidson and Hendry Gwaltney, drilling contractors and producers in the Illinois basin area, have moved their offices from Mount Vernon, Ill., to Washington, Ind. The firm operates one rotary rig.

Fleet Drilling Co., Ada, Okla., is moving in a heavier rig to replace the rig it has been using on the deep wildcat test it is drilling for Ryan Oil Co. at 1 Gordon, in the SW NW SE 20-10n-26w, 4 miles west of Mayfield, northwestern Beckham County, western Oklahoma. The heavier rig will deepen the hole from 5,657 ft. to its originally projected 10,000-ft. depth.

Nuckolls-Bell Drilling Co., Oklahoma City, has contracted with Smith & Cleary of Oklahoma City for a projected 3,900-ft. test to be drilled at a wildcat location 7 miles northwest of Chandler, Lincoln County, Oklahoma. Location is for 1 Sprague, in the NE SE SE 6-15n-4e.

Garvey Drilling Co., Wichita, is drilling for **Anschutz Drilling Co.,** also of Wichita, at a rank wildcat location 8 miles northeast of Phillipsburg, Phillips County, northern Kansas. The operation, 1 Cannon, is in the SW SW SW 17-2-17.

Stearns Drilling Co., Russell, Kans., is drilling on two new contract jobs in the immediate Pratt area, in Pratt County, western Kansas. One is a wildcat test for **Armer Drilling Co.** at 1 Long, NW NW NE, 18-28-12, just north of the Pratt townsite. The other is for Time Petroleum Co. at 1 Banbury, SE SE SW 18-28-12, 3½ miles southeast of town.

Loffland Brothers Co., Tulsa, has taken on two more deep-drilling contracts in southern Louisiana, both in Terrebonne Parish. One will be a 13,-

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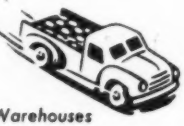

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000-ft. wildcat test to be drilled for Cities Service Oil Co. at 1 Guidry, in 36-17s-18e. The other will be a 11,500-ft. well to be drilled for Union Producing Co. at 2-A Continental, in 6-18s-14e, in the Turtle Bayou area.

Lee Whitehurst Drilling Co., Shreveport, has the contract for Marine Oil Co.'s second well for the new North New London field in Union County, Arkansas. The new operation will be 1 Olin, with location in the C SW SE 29-17s-12w, about a mile southeast of the discovery well. The latter well produces from Smackover lime at a depth of approximately 6,050 ft.

Voth Brothers have contracts for two 1,200-ft. Nacatoch sand tests to be drilled for R. M. Iglehart of Dallas in the Willisville field, Nevada County, Arkansas. The tests will be Nos. 1 and 2 Malone, both located in the N½ NW NW 20-14s-21w.

H. B. Mabee Co., Oklahoma City is the contractor on a new operation which Fordee Rhoades Oil Co. is starting in the newly opened extension area south of the West Central School field, 3 miles south of Coyle, Logan County, Oklahoma. The new well, 1 Tilmon, in the SW NW SE 27-17n-1e, is an offset to the extension discovery well, completed by the same operator as a Wilcox sand producer at 5,100 ft.

H. O. Grace Drilling Co., Wichita Falls, Tex., has a rig under contract to Consolidated Oil Co. for a projected 5,300-ft. test to be drilled at a wildcat location a mile north of Scotland in Block 54, Pennington Survey, Archer County, North Texas.

Tripledee Drilling Co., Ardmore, Okla., has a contract with State Oil Co., also of Ardmore, for a 3,500-ft. test, 1 Lane, to be drilled at a wildcat location in the NE SE SE 31-4s-1e, 5 miles west of Ardmore, Carter County, southern Oklahoma. Objective is the Sycamore zone. Location is about 3 miles south of the new Deese and Dornick Hills sand field just opened by Sinclair Oil & Gas Co.

ACTIVE ROTARY RIGS*
(United States and Western Canada)

Area—	Week ended 4-14-52	Change week ended 4-7-52	Change week ended 4-16-51
Gulf Coast	617	—11	+ 76
N. & W. Tex.-N.M.	1,052	—14	+206
Ark.-N. La.-E. Tex.	147	— 2	+ 13
Oklahoma	346	+ 8	+ 54
Kansas-S. Nebraska	174	—16	+ 19
Illinois-Eastern	109	+13	+ 46
Rocky Mountains	187	+10	+ 72
Pacific Coast	160	+ 1	+ 3
Total U. S.	2,792	—11	+489
Western Canada	140	—31	+ 40
Total	2,932	—42	+529

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States and the Rocky Mountains and Western Canada areas are shown on pages 224 and 225.

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NEW YORK.—Underground-storage facilities of Consolidated Natural Gas Co. supplied 21 per cent of the gas required by that system during the 1951 heating season.

During the coldest days in 1951, storage furnished 47 per cent of the gas sold; of the remainder, 44 per cent was obtained by purchase and only 9 per cent came from production developed within the Consolidated system.

Record inventories.—The highest point in Consolidated's inventory history was recorded October 30, 1951, when gas in storage reached 136,747,000 M.c.f., an increase of 48 per cent above the peak of the previous year.

Last year the system stored 86,468,000 M.c.f. of gas in 24 fields in Pennsylvania, West Virginia, and Ohio. In the same period, withdrawals from storage totaled 45,032,000 M.c.f. The net addition to storage of 41,436,000 M.c.f. raised inventories to a record 119,127,000 M.c.f. at the end of the year.

Storage-plant expenditures during 1951 were concentrated principally on the Oakford and South Bend storage fields located in western Pennsylvania. The South Bend project is nearly completed.

Largest storage unit.—Oakford, 30 miles east of Pittsburgh, is the world's largest underground natural-gas-storage project. The $28,400,000 program is a joint venture of Consolidated and Texas Eastern Transmission Corp. *(The Oil and Gas Journal, August 2, 1951, page 41).*

Consolidated's one-half share will cost about $14,200,000, of which $9,300,000 is being expended for plant facilities and $4,900,000 for base storage gas required to develop sufficient pressure in the field. During 1951, $5,400,000 was spent by Consolidated and $5,000,000 more is budgeted this year. The first of two 15,000-hp. compressor stations at Oakford was completed early this year.

Full development of the Oakford project will not be achieved until 1954, at which time it is anticipated that 105,000,000 M.c.f. will be in storage including 45,000,000 M.c.f. of cushion. The remaining 60,000,000 M.c.f. will be in storage including 45,000,000 M.c.f. of cushion. The remaining 60,000,000 M.c.f. of flexible-inventory storage will be available for withdrawals and will permit the field to deliver a volume of 400,000 M.c.f. each day during the five heating months of the year. This gas will be divided equally between the two participating companies. Operation will be shared by New York State Natural Gas Corp., a Consolidated subsidiary, and Texas Eastern.

Storage facility expenditures during 1951 also included $1,500,000 for the Sabinsville field in north-central Pennsylvania. Budgeted expenditures of an additional $1,000,000 will complete construction of plant facilities in this field. Sabinsville will be one of the larger storage fields in the Consolidated system with a capacity of 31 billion cubic feet above cushion pressure and a maximum daily deliverability of 400,000 M.c.f.

Attention Focused on New Markets at Los Angeles

LOS ANGELES.—Special attention will be paid to new markets now opening and to prospective increases in present markets for natural gas at the spring conference of the natural-gas department of the American Gas Association to be held here May 12-13.

Industry men from throughout the country will gather at the Biltmore Hotel to exchange views on the present status and future of the industry, which has allocated about $3,000,000,000 for new plants and facilities during the next 4 years.

Presiding at general sessions both days and delivering the keynote address on the significance of industry progress will be Charles E. Bennett, president of Manufacturers Light & Heat Co., Pittsburgh, and chairman of A.G.A.'s natural-gas department.

Alden G. Roach, president of Columbia-Geneva Steel Division, United States Steel Co., San Francisco, will discuss pipe priorities. Claude A. Williams, president of Transcontinental Gas Pipe Line Corp., Houston, will discuss the future of the industry.

Sid Richardson Considering $19,000,000 Ammonia Plant

NEW ORLEANS—Entrance of Sid Richardson Gasoline Co. into the ammonia field is being contemplated according to a company spokesman. If followed through, it would mean the construction of a $19,000,000 plant at Pointe a la Hache, La., about 40 miles southeast of here.

The National Production Authority has already granted the company a certificate for accelerated tax amortization, but a company official said that final decision has not been reached. This would depend upon the results of a careful examination of the sales outlets and potential market for ammonia.

Cost estimates have already been received on the plant, but to date no contractors have been selected, pending final decision. The plant would be designed to produce 86,400 tons annually.

At the present time, the company has two gas-booster stations under construction, one at the Pointe and the other at Cox Bay. The stations are to be used to gather gas from the two respective fields of Pointe a la Hache and Cox Bay, both in Plaquemines Parish, and raise it to a pressure of 850 lb. preparatory to entering a gas-transmission line.

If the plant is not constructed, the gas in the fields will be sold to private customers. No gas is under contract at the present time.

Texas Commission Requires Reports on All Gas Flared

AUSTIN.—The Texas Railroad Commission has advanced another step in its continuing fight to reduce waste of gas in Texas oil fields recently estimated to be about 5 billion cubic feet monthly.

Producers, beginning May 1, will be required to file monthly reports with the commission on gas flared from all wells. Reports will be mandatory on the amount of gas flared from a well even where it is not connected to a natural-gasoline plant. This flaring is not now being reported. Only estimates on gas flared by these wells will be asked from operators—no metering will be required.

Little Change in Tax Fight

AUSTIN.—Little change was reported in the lineup of firms protesting Texas' hotly contested gathering tax, according to State Comptroller Calvert's monthly report.

March collections came to $1,014,655, against $1,047,344 in February. Protested payments by 80 firms totaled $627,184, compared with 75 firms protesting $650,875 in February payments.

Sales Up 9 Per Cent

NEW YORK.—Natural-gas sales to ultimate consumers in February totaled 4,931 million therms, a gain of almost 9 per cent over that sold in the same month last year, the American Gas Association reports.

For the 12 months ended February 29, sales totaled 45,899 million therms, up 14 per cent over the previous year. The A. G. A. index of sales in February was 402 per cent of the 1935-39 average.

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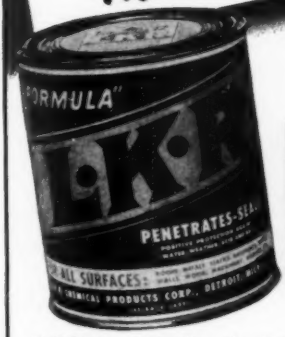

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PIPE LINES

Conference Starts

Products pipe liners set for third annual meeting

FORT WORTH.—The third annual Products Pipe Line Conference sponsored by the American Petroleum Institute's Division of Transportation gets under way here this week.

Featuring the meeting, at the Blackstone Hotel April 21-23, will be seven technical papers, two field trips, and a panel discussion.

The first day's session is reserved for a symposium on pipe lines. Papers to be presented and their authors are:

Papers.—"Description of Dehydration Equipment and Practices on Products Pipe Lines," R. P. Dougherty, Wyco Pipe Line Co., Denver; "Safety in the Pipe Line Industry," J. H. McKenzie, General Petroleum Corp., Los Angeles; "A Study of the Causes of Pipe Line River Failures and Methods of Prevention," J. R. Giese, Great Lakes Pipe Line Co., Kansas City, Mo.; "Meter Calibration on Product Pipe Lines and Adoption and Use of A.S.M.E.-A.P.I. Meter Code 1101," Sun Pipe Line Co. of Pennsylvania, Philadelphia.

"Interrelation Between Terminal Design and Operation and Products Pipe Line Deliveries," S. A. Hallberg, Standard Oil Co. (Ind.), Chicago; "Economic Comparison Between Metering and Tank Gauging of Products Pipe Line Deliveries and Receipts," O. M. Turner, Standard Oil Co. (Ohio), Fostoria, Ohio; "Factors Affecting Conservation Roof Tankage in Products Pipe Line Operations," S. S. Smith, Shell Oil Co., New York. An official of the Petroleum Administration for Defense also will address the meeting.

H. H. Anderson, vice president of Shell Pipe Line Co., and James E. Moss, director of the A.P.I. Division of Transportation, will address a joint session of pipe liners and the accident-prevention and fire-protection committees of the A.P.I. on the evening of April 21.

Field trips.—On Tuesday and Wednesday afternoon, two field trips are scheduled to pump stations and terminals of Humble Pipe Line Co. and Texas Pipe Line Co. at Hearne, Tex., and products terminals of Sinclair Pipe Line and Humble Pipe Line at Dallas.

The panel discussion will take place Wednesday morning with J. W. deGroot, Tuscarora Oil Co., presiding and W. G. Hortsman, general superintendent of Plantation Pipe Line Co., Atlanta, Ga., serving as moderator.

Panel members are G. D. Harden, Shell Oil Co.; L. R. Dickinson, Socony-Vacuum Oil Co.; L. M. Miller, Sun Oil Co.; Ivy M. Parker, Plantation Pipe Line; L. E. Cook, Sinclair Pipe Line; D. Levy, Magnolia Pipe Line Co., and J. P. West, Sohio Pipe Line Co.

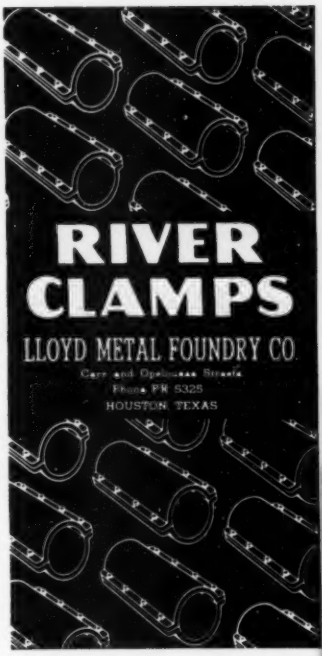
New Spread Working West in Nebraska on Platte Project

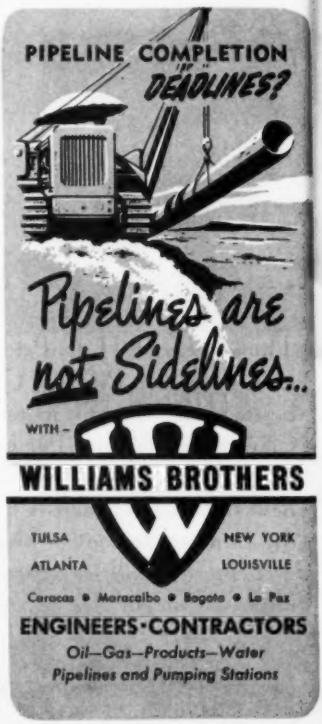
INDEPENDENCE. — A third construction crew has started work on the big Platte Pipe Line Co. crude trunk from Worland, Wyo., to Wood River, Ill.

The new spread, placed on the job by R. H. Fulton & Co. and Brodie Construction Co., is starting at the Nebraska-Kansas state line and working westward to Holdrege, Neb.

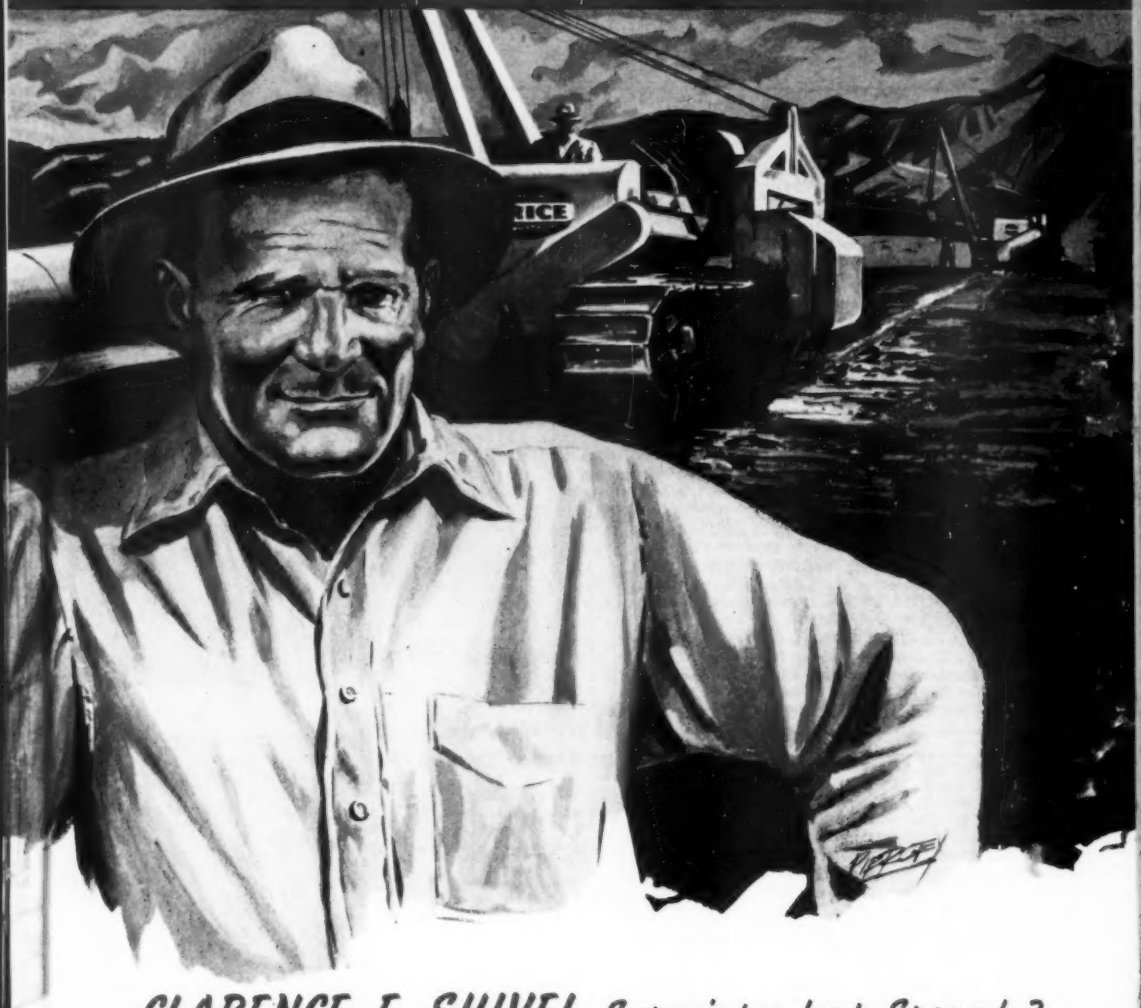
Two other spreads have completed 500 miles of the 20 and 16-in., 1,056-mile line since they started work last year. O. R. Burden Construction

OPERATIONS RESUMED.—The grain elevator in background hints at the location of this rail yard full of big-inch pipe. The pipe was unloaded recently at yards in Franklin and Webster counties, Nebraska, as Platte Pipe Line Co. prepared to resume laying operations on its 1,100-mile, 20 and 16-in. crude trunk from Worland, Wyo., to Wood River, Ill. The line in this area crosses the northeastern part of Franklin County and the northern part of Webster County.





PRICE PIPELINE PORTRAITS



CLARENCE E. SHIVEL *Superintendent, Spread 3*

The success of H. C. Price Co. as "America's Foremost Pipeline Constructors" can be measured largely in terms of men like Clarence E. Shivel. For behind the army of machines that toil ceaselessly to stretch new steel arteries across the nation stands the human element — that "priceless ingredient" of skill, experience and dependability that is the mark of HCPCO personnel. Before rising to the position of superintendent, Shivel had served as a pipe gang foreman and prior to that he had taken a turn on nearly every spread job. This veteran of 24 years in pipelining is today responsible for directing one of the complex, hard-driving teams of men and equipment that are building for a better Tomorrow.

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Corp. has completed the section between Salisbury, Mo., and Wood River, Ill., and now is working westward from Salisbury.

R. H. Fulton has completed all pipe laying in Wyoming and now is working eastward from the Wyoming-Nebraska state line.

Company officials said that the line will be completed and in operation by late summer, unless delivery of the final 175 miles of pipe scheduled in May, June, and July should be delayed by a shutdown of the steel industry.

Main pump stations will be built at Casper, Wyo., Ogallala, Neb., Marysville, Kans., and Salisbury, Mo. Injection stations will be located at Chatham, Lost Cabin, and Guernsey, Wyo., and Gurley, Neb.

Initial capacity of the line will be 110,000 bbl. per day. Capacity can be increased as production in Wyoming, Nebraska, and Colorado increases by adding more pump stations at Yoder, Wyo., Holdrege, Neb., and Gower and Monte, Mo.

The $60,000,000 project is a joint venture of British American Oil Co., Ltd., Continental Oil Co., Pure Oil Co., Ohio Oil Co., and Sinclair Oil Corp., either directly or through subsidiaries.

Pasotex Starts Work on New 195-Mile Texas Crude Line

EL PASO, Tex.—Pasotex Pipe Line Co., a subsidiary of Standard Oil Co. of Texas, has started preliminary work on a new 195-mile, 8-in. crude line from Wink, Tex., to this city.

The $3,500,000 project will parallel another 8-in. carrier, in operation since 1928, and will increase by 25,000 bbl. per day the flow of crude from the Permian basin of West Texas and Southwest New Mexico.

It is expected that contracts will be let early in May for laying the line, erecting storage tanks, and other major work. The carrier should be completed and in operation by October of this year. A steel allocation of 12,000 tons has been approved by the Petroleum Administration for Defense.

Pasotex Pipe Line transports oil from fields in Winkler, Ward, Loving, and Pecos counties, Texas, to refineries in El Paso owned by Standard of Texas and McNutt Oil & Refining Co.

Sun Pipe Line to Lay New Products Carrier in Ohio

PHILADELPHIA.—Sun Pipe Line Co. of Pennsylvania will lay a new 110-mile 8-in. products pipe line this summer to connect existing lines in northern Ohio.

The company said it plans to ask for bids for construction of the $3,000,000 project about the first of June. The line will run between Fostoria, near Toledo, and Hudson, near Akron, and will have an initial capacity of 17,000 bbl. per day. Completion is scheduled for the last of September.

Sun Pipe Line, a wholly owned subsidiary of Sun Oil Co., said the Petroleum Administration for Defense has approved allotment of pipe for the project. Installation of the new line will provide the last link in Sun's products system, tying together its Marcus Hook and Toledo refineries. At present, products are pumped westward to Cleveland from Marcus Hook. On completion of the new line, the Toledo refinery will supply both Cleveland and the Youngstown-Akron area.

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REFINING

Derby's Wichita Refinery Expansion Nears Completion

WICHITA.—Derby Oil Co.'s modernization and expansion program at its 10,000-bbl. refinery here is nearing completion.

The program involved installation of a catalytic cracking unit, a new crude unit, and additional storage tanks. Plant capacity will be raised to 15,000 bbl. per day when the new units are placed in operation.

E. Wasser, vice president and secretary, said the new facilities are now being brought on stream, and preliminary tests indicate that anticipated improvements in yields and plant operations will be realized.

Refining Dividend Payments Drop Sharply in February

WASHINGTON.—Publicly reported cash-dividend payments by refining corporations dropped to $3,200,000 in February from $14,400,000 in the same month last year, but the Department of Commerce, which compiles dividend statistics, saw little significance in the drop.

The department explained the decline as the result of a shifting of regular February dividend disbursements to March payment dates, occasioned in large measure by provisions in the excess-profits tax regulations. By delaying dividend payments at least 60 days after the end of the calendar or fiscal year, a corporation which uses the invested capital basis of computing its excess-profits credit is able to take full advantage of 1951 retained earnings in calculating its excess-profits tax exemption.

The deferment in distribution of dividends also had tended to reduce January payments, and refining dividends for the first 2 months of the year, amounting to $9,200,000, were $10,000,000 below the $19,200,000 paid out in the same period in 1951, the department reported.

Humble Preparing to Build Baytown Paraxylene Plant

HOUSTON.—Humble Oil & Refining Co. will begin construction in September on a new paraxylene plant at its Baytown, Tex., refinery.

The plant is scheduled to begin operations in May 1953, producing at a rate of more than 2,000,000 lb. per month. Contract has been let to C. F. Braun Construction Co., which is currently engaged in purchasing materials.

Humble will incorporate in the plant a special separation and purification process developed by the company's research engineers to obtain substantially pure paraxylene from a crude mixture of hydrocarbons containing ortho, meta, and para xylenes, ethyl benzene, and about 1 per cent nonaromatics. Humble said a pilot plant at the refinery recently proved the effectiveness of the

SAFETY CERTIFICATES.—The American Petroleum Institute recently presented Standard Oil Co. of California with 11 accident-prevention awards in recognition of 10,500,000 man-hours worked by employes without disabling injury. T. S. Petersen, Standard president, acting on behalf of A.P.I., here presents the certificates to G. A. Davidson and Gage Lund, vice presidents under whose jurisdiction the safety records were achieved. Nine 1,000,000-hour certificates went to units of the company's Richmond, Calif., refinery, one 1,000,000-hour certificate to its El Segundo, Calif., refinery, and one 500,000-hour certificate to the East Coalinga division of the producing department. Left to right during presentation are Davidson, Lund, Jules Toussaint, vice president, and Petersen.

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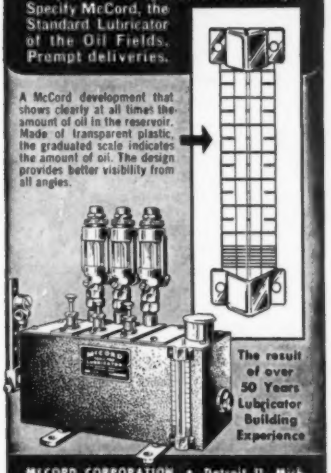
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Paraxylene is one of the raw materials for a new synthetic fiber called Dacron.

Federal Oil Taxes Bringing In Far More Than in 1951

WASHINGTON. — An increase in the rate on gasoline and the new tax on diesel fuel have pushed Treasury collections from levies on oil far above 1951 levels.

February revenue from the tax on gasoline was $70,332,554 against $47,828,609 in the same month last year at the lower rate then prevailing, and the diesel tax brought in $1,421,657, the Internal Revenue Bureau reported. Receipts from pipe-line transportation increased to $2,560,109 from $2,020,305, but the return from lubricating oils dropped to $5,616,169 from $6,191,756.

For the first 7 months of the Government's fiscal year collections from gasoline aggregated $466,118,429 against $388,344,681 a year ago, up $77,773,748; diesel oil, $2,582,665 against nothing; pipe-line transportation, $18,171,263 against $16,298,218, up $1,873,045; and lubricating oils, $57,459,966 against $69,694,806, down $12,234,840, the bureau disclosed.

Shell Starts Construction Of New Unit at Wilmington

LOS ANGELES.—Preliminary construction on a single-column crude-distillation unit at Shell Oil Co.'s. Wilmington refinery has been started. Costing about $7,000,000, the 52,000-bbl. unit is scheduled for completion in late 1953 or early 1954. Bechtel Corp., San Francisco, will build the plant.

Completion of the unit will increase the refinery's daily crude-intake capacity to approximately 75,000 bbl., bringing this capacity more in line with refinery cracking capacity.

For years a portion of the cracking stock required at Wilmington has been purchased from other companies. Lessening of this supply left Shell largely dependent on its own crude-processing facilities, and resulted in the decision to erect the new unit.

Philadelphia to Host First World Instrument Congress

PHILADELPHIA. — Instrument manufacturers in the world's free countries have been invited to exhibit their apparatus at the First International Instrument Congress and Exposition scheduled to be held here in September 1954.

Information on the First International Instrument Congress and Exposition may be obtained from Richard Rimbach, managing director, 921 Ridge, Avenue, Pittsburgh 12, Pa.

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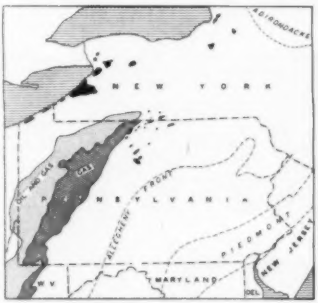
Pennsylvania Getting Second Look

AS never before in history the great volumes of as-yet-unproductive sedimentary rocks throughout the United States are being studied to pinpoint the oil that regional geology indicates they contain. Some of these untouched or barely scratched sedimentary units are remote from current production, others are adjacent to or beneath now-producing areas.

The Williston basin was opened but 1 year ago, yet immediate development of the discovery areas will be limited only by the lack of big rigs, which may prove hard to lure away from busy West Texas and other southern areas. The Uinta basin, though running into technical difficulties in its attempt to burst into a full-fledged development stage, is another example of interest in a once-too-remote basin. In recent weeks the Delaware basin of West Texas *(see page 59, March 31 issue)* has seen a beginning of what may prove to be a glorious future—a future that may rival the now-booming Midland basin.

Currently looked upon with an attitude not unlike that which existed toward any one of the above-mentioned basins before they hit, is the northern end of the 750-mile-long Appalachian basin. The growing interest in this long-considered marginal area can be attributed to changing ideas as the hunt for oil grows more difficult. The area was left for the comparatively easy-hunting basins on to the west but, now that parts of the West are approaching a point similar to that which the Appalachian region reached shortly after the turn of the century, oil hunters are taking a second look at Pennsylvania's potentialities.

Many think of Pennsylvania as an area of high-grade crude oil, low per well producing rates, and near-miraculous water-flood recoveries—they're right. They also think of the commonwealth as a slow-dying area—that's not quite right because, though the drilling that continues in the old area (shaded on sketch) results in only a few gas discoveries of but local importance, there exists a real exploratory interest in deeper rocks to the north and east. This exploratory interest was initiated about 1930 with the discovery of gas in the Lower Devonian - Oriskany along the New



York-Pennsylvania line, northeast of the old fields. Since the flurry in the immediate area there have been two significant discoveries that have stepped Oriskany production to the southeast: substantial gas at East Fork-Wharton dome in 1947 and at Leidy dome (arrowed on sketch) in 1950. Current exploratory effort is devoted to a search for more Oriskany gas production on the numerous long anticlines within the Plateau province and for oil or gas production in the Ordovician and Cambrian rocks (the younger rocks have been ground away from the anticlinal crests) of the complex Ridge and Valley province between the Allegheny front and the Piedmont area. Production has yet to be found in the mountain area but only a couple of scientifically located wildcats, drilled last year, have checked this challenging province.

Pennsylvania currently imports about 65 per cent of its natural-gas supply from the Southwest. Production at Leidy, the last big shot in the arm for local production, is declining. This field has yielded some big wells, notably New York State Natural Gas Corp. 1 Finnefrock (probably the largest gas well ever completed in the Appalachians) which produced nearly 20,000,000 M.c.f. of gas last year and is still good for 25,000 M.c.f. daily. With wells like that possible, a hungry market, and 25-30 cents per 1,000 cu. ft. at the well, the search for gas in this area will not be discouraged easily.

Judging from the interest the northern Appalachian area is getting from Appalachian operators and several companies whose realms of operations have been in the West, parts of Pennsylvania, Maryland, West Virginia, Virginia, and eastern Ohio might soon be hot spots again.

Philip C. Ingalls.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

NORTH DAKOTA.—Amerada Petroleum Corp. 1 Risser, Croff area wildcat, McKenzie County, flowed 213 bbl. of oil with some water and gas in 24-hour test of Madison between 9,515-80 ft. following acid treatment.

WYOMING.—J. Ray McDermott recovered oil on drill-stem test of the Shannon sand at the Ash Creek, Sheridan County, wildcat. The well is the first to find oil in this portion of the Powder River basin.

CANADA.—The team of Punch Petroleums, Ltd., and Rio Tinto Alberta Oils, Ltd., has found oil and natural gas encouragement at its second structure test well in the Northwest Territories.

CALIFORNIA.—A significant new pool discovery on the southwest flank of the old Wheeler Ridge field, southeastern San Joaquin Valley, has been made by Richfield Oil Corp. The discovery produced 1,170 bbl. daily at 9,600-9,757 ft.

WEST TEXAS.—Phillips Petroleum Co. 1-EE University flowed 52 bbl. of oil in 1 hour on its seventh test of the Ellenburger at 10,970-11,015 ft. All tests have shown oil and four of them have made a good flow of oil. Pennsylvanian oil underlying the Spraberry was proved by Tex Harvey field's original discovery. Drill-stem test in the Pennsylvanian flowed 150 bbl. of oil.

North-Central Texas

Flush Producer Indicated At Kinder Field Well

WICHITA FALLS.—Kinder field of Jack County had prospects of a flush producer at Star Oil Co. 1 Ruth-Barham. On ¾-in. choke, the well gaged 185 bbl. of oil in 3½ hours, from perforations at 4,706-12 ft. Average production from other wells in the field is around 180 bbl. per day.

In Montague County, Transcontinental Oil Co. 1 M. M. Gilbert developed 2,190 ft. of gas, 90 ft. of heavily oil and gas-cut mud and 60 ft. of free oil on a drill-stem test from 6,262-68 ft. Operators were drilling ahead at 6,278 ft. on a 6,750-ft. contract. Location is 6½ miles southeast of Nocona.

The new oil area 4 miles southeast of Nocona had two confirmation tests planned. J. B. Revier et al had locations spotted for his 2 and 3 Mrs. L. A. McNabb, both 6,000-ft. operations in the MEP&P Survey, A-516. They will be northwest and southwest offsets to the McNabb discovery.

In the same vicinity, An-Son Petroleum Corp. scheduled its 1 C. H. Dill as a northeast offset to George Engle 1 Fenoglio, Caddo discovery in the E. Ferrill Survey.

East of Montague, Jack Grace 1 Mrs. J. C. Bryant completed as a pumping discovery, with a daily potential of 285 bbl. of 41°-gravity oil from pay sand at 5,816-32 ft. Total depth was 6,550 ft. in conglomerate, which carried water.

Deep Rock Oil Corp. 1 Key, wildcat 12 miles northwest of Anarene in Archer County, developed light oil shows on a drill-stem test at 4,815-30 ft. At 4,815-30 ft. recovery was 5 ft. of oil and 100 ft. of heavily oil-cut mud. Operators were drilling ahead at 4,886 ft.

In Jones County, Onyx Oil Co. found gas shows at its 1 D. L. Bristow, wildcat 11 miles west of Anson in the John H. Gibson Sur. 1. Drill-stem test in sand at 3,080-97 ft. developed 1,600 ft. of gas, 225 ft. of oil and 50 ft. of heavily oil-cut mud. Operators were drilling ahead below 3,816 ft.

Clark & Cowden Production Co. staked location for 1 Fritz Segestrom, 3,350-ft. rotary test 5½ miles northeast of Hamlin in Section 134, BBB&C Survey, also in Jones County.

In Nolan County, Gem Oil Co. 1 L. S. Howard, wildcat 4 miles southwest of Sweetwater, was dry at 7,383 ft., total depth. Mar-Tex Realization Corp. 1 Mrs. G. W. Cochran, northwest of Blackwell, was drilling at 6,074 ft. Northeast of Blackwell, Seaboard Oil Co. 1 Turner May was running casing to 6,500 ft., and in the new and unnamed area 10 miles southwest of Sweetwater, Sun Oil Co. 1-A TXL gaged 40 bbl. of oil in 6 hours through 5/32-in. choke.

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NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Callahan County: Elmer R. Perkins 1 A. J. Ellis, Sec. 3,198, T&EL, TD 3,275 ft., elev. 1,480 ft., Caddo 3,179 ft., perforated 3,200-12 ft., IP pumped 18 bbl. 42°-gravity oil.

Haskell County: Youngblood & Foree 2 Kleiner Est., R. Langham Sur., TD 3,347 ft., Palo Pinto 3,340 ft., IP pumped 103 bbl. 39°-gravity oil.

Jack County: D. H. Bolin 1 D. Leatherwood, Blk. 3,308, TE&L, TD 4,959 ft., perforated conglomerate 4,858-66 ft., IP 20 bbl. 38°-gravity oil, 13/64-in. choke, TP 175 psi., GOR 1,700 cu. ft.

Montague County: Hawkins & Hightower Oil Co. 1 Mirtie Harper, Wm. Donohoe Sur., A-178, TD 877 ft., pay 852 ft., IP pumped 11.6 bbl. oil.

Shackelford County: F. Kirk Johnson 2 W. P. Newell, 10-13-T&P, TD 1,570 ft., pay 1,560 ft., IP pumped 22 bbl. 38°-gravity oil.

Stephens County: Ro-Paco Oil Co. 1 J. M. Fambro, 34-6-T&P, TD 3,915 ft., gas pay 3,900 ft., IP 4,500,000 cu. ft., SIP 1,085 psi.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: Bridwell Oil Co. 38 Bridwell-Jackson, Wm. Aldbridge Sur., dry, TD 1,605 ft.

Bridwell 3 Belle Wisdom, Blk. 36, Jose Ostone Sur., dry, TD 1,700 ft.

L. T. Burns 1 Harmonson Estate, J. B. Hinds Sur., A-183, dry, TD 4,659 ft.

Sid Perryman and Oltex Drilling Co. 1 Bethania Hospital, Blk. 2,402, TE&L, dry, TD 1,275 ft.

J. B. Wilshire and R. C. Knapp 1 Calvin Benson, Blk. 12, Jefferson CSL, dry, TD 1,174 ft.

Wilshire and Knapp 1-A Benson, Blk. 12, Jefferson CSL, dry, TD 1,194 ft.

Frank Wood Associates, Inc. 1 W. J. Geis, 44-3-Clark & Plumb, dry 4,170 ft.

Baylor County: W. T. Waggoner Est. 1-FFF Waggoner, Sec. 53, T&NO, dry, TD 5,773 ft.

Callahan County: Freeland & Young 1 Jesse Ann Bowen, Juan Delgado Sur., dry, TD 928 ft.

Coleman County: Bay Petroleum Corp. 1 Taylor Estate, H&GN Sur. 281, dry, TD 2,800 ft.

Calsen Enterprise 1 L. G. Garrett, Sec. 82, C. T. Pendleton Sur. 274, dry, TD 1,997 ft.

Viking Oil Corp. 1 Elgean Shield, W. H. Bynum Sur. 272, dry, TD 2,300 ft.

Cooke County: R. B. Hollandsworth 1 Lucy Spires Stark, Blk. 11, Hunt CSL, dry, TD 1,612 ft.

Eastland County: Anderson & Durham 1 G. F. Harper, CSL, dry, TD 3,281 ft.

Dave Casey 1 R. C. Snyder, Guadalupe CSL, dry, TD 3,184 ft.

Terrell Petroleum Co. 1 C. B. Pruet, Mark Haley Sur., dry, TD 4,037 ft., elev. 1,569 ft., Marble Falls 2,289 ft., Barnett 3,857 ft., Ellenburger 3,923 ft.

Fisher County: Noranda Oil Corp. 1 E. J.

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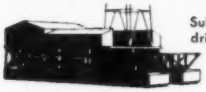
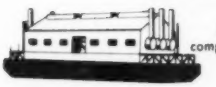


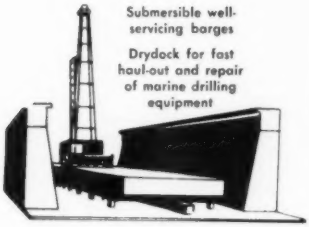
Submersible drill barges

Tugs



Boiler and compressor barges

Water, oil, and supply barges



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Levingston is not only located conveniently with respect to marine drilling operations on the Gulf Coast, but here you will find marine engineers and constructors who understand the language of oil operators. Bring your marine petroleum equipment problems to Levingston *first* for a quick economical solution.

Levingston

SHIPBUILDING CO.

Orange, Texas

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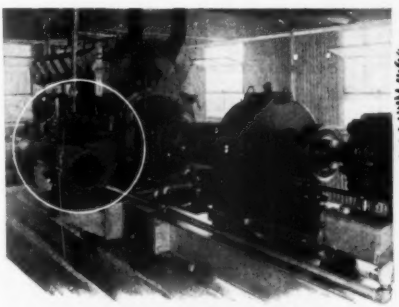
That's right! Ansul Dry Chemical Fire Extinguishers are Water-tight. Thousands of Ansul Extinguishers stand guard over difficult fire hazards in locations where the extinguisher cannot be protected from the weather.

For installations where extinguishers cannot be pampered with expensive shelters, water-tight construction is essential for dependable fire protection. That's one reason you see so many more Ansul Dry Chemical Fire Extinguishers in outdoor locations protecting all sorts of tough hazards associated with the petroleum industry.

SEE PAGE 218



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WISCONSIN-POWERED *Starting Unit Assures Fast Starts*

Big engines don't deliver dependability unless the starting engine *starts every time* . . . which is why the great majority of power users, 3 to 30 hp., feel safer when the starting engine bears the name "Wisconsin," as typically illustrated here.

The way a Wisconsin Engine is built is a clue to its dependability and universal acceptance. Both ends of every crankshaft ride on tapered roller bearings, preventing bearing failure. Every Wisconsin cools by air . . . no winter freeze ups or summer overheating. And an OUTSIDE magneto with impulse coupling assures easy-servicing, but most important, quick starts and steady, all-season dependability.

These are the features *behind* the *far ahead* performance of Wisconsin-powered equipment.

4-cycle single-cylinder, 2-cylinder and V-type 4-cylinder models, 3 to 30 hp.

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MILWAUKEE 46, WISCONSIN
World's Largest Builders of Heavy-Duty Air-Cooled Engines

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OIL FIELD DISTRIBUTORS FOR WISCONSIN ENGINES AND ALL TYPES OF UTILITY UNITS.

Kiker, 10-2-H&TC, dry, TD 6,440 ft., elev. 1,967 ft., reef 5,470 ft.

Union Oil Co. of California 1 F. B. Houghton, G. W. Lawrence Sur. 220, dry, TD 6,110 ft., elev. 1,979 ft., Canyon sand 4,658 ft.

Jack County: Bolin Oil Co. and Cabot Carbon Co. 2 R. H. Massie, N. B. Overby Sur., dry, TD 3,704 ft.

Jones County: Great Lakes Carbon Corp. 1 J. F. Walker, 16-1-BBB&C, dry, TD 2,763 ft.

Onyx Oil Co. 1 H. H. Rowland, Sec. 42, OAL Sur., dry, TD 2,352 ft., elev. 1,622 ft., Gunsite 2,208 ft., King sand 2,225 ft., Swastika 2,332 ft.

Shackelford County: West Central Drilling Co. et al 1 G. R. Davis, N. M. Gladden Sur., dry, TD 1,827 ft.

Stephens County: Pitzer & Sons 1 Henry Thompson, 16-4-T&P, dry, TD 2,571 ft.

Sorrels Oil Co. 1 Ross Elliott, 37-7-T&P, dry, TD 3,780 ft., Caddo 3,416 ft.

Texas Pacific Coal & Oil Co. 1 Whitney, Sec. 4, J. Gregg Sur., dry, TD 4,785 ft.

Wichita County: Ted A. Norwood 1-A Myers, Blk. 830, TE&L Sur., dry, TD 1,900 ft.

Schram & Caudill 1 Mrs. M. E. Carey, Blk. 10, Pratt & Thornberry Sur., dry, TD 1,618 ft.

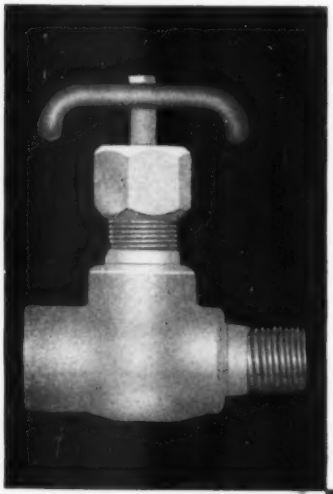
Wilbarger County: Neeld & Hood Drilling Co. 1 W. T. Waggoner Est. 10-13-H&TC, dry, TD 2,005 ft.

F. J. Pounds 1-C Pounds-Waggoner, 103-14-H&TC, dry, TD 1,511 ft.

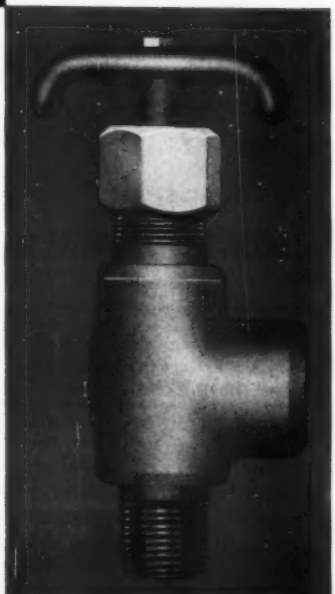
Frank Wood 2-ZZ W. T. Waggoner, Sec. 16, H&TC, dry, TD 1,111 ft.

Frank Wood 1-AAA W. T. Waggoner, 26-4-H&TC, dry, TD 2,505 ft.

Young County: E. H. Remington 1-B Taach, Sec. 248, TE&L Sur., dry, TD 658 ft.



This is the Best Connection you'll ever make!



There is a difference in needle valves . . . and O-C-T makes the difference

O-C-T Needle Valve bodies are single piece drop forged steel. The male thread is made as an integral part of the valve which gives you a more compact, stronger connection. This one-piece O-C-T Needle Valve design eliminates the use of nipples and minimizes the chances for leakage. Buy O-C-T Needle Valves from your supply store. There is a difference . . . and O-C-T makes the difference!

Oil Center Tool Co.

P. O. Box 3091

Houston, Texas

Export Representatives: Sterling Areas — Le Grand, Sutcliff & Gell, Ltd., Rochester, Kent, England. Address Export Inquiries for **All Other Countries** to P. O. Box 3091, Houston 1, Texas.

Texas Gulf Coast

New Wilcox Pool Indicated In Lavaca County

HOUSTON.—A new Wilcox oil pool is in the offing at Kirby Petroleum Co. 1 Edgar Laas, Samuel Fuller Survey, Abstract 18, Lavaca County. On 17-minute drill-stem test at 8,072-77 ft., recovery was 1,000 ft. of 40°-gravity oil and 120 ft. salty, oily mud. Shut-in pressure was 2,100 psi. after 5 minutes and bottom hole flowing pressure was 1,450 psi. This prospective strike is located 8½ miles northeast of Hallettsville.

A new oil reservoir has been opened 3 miles southeast of Pledger field and 7 miles northeast of Old Ocean field in Brazoria County, at Superior Oil Co. 1 Mae C. McDonald. Brewster & Bartle Drilling Co. drilled the hole to 10,423 ft. and operation was then taken over by Superior. Seven inch casing was cemented at total depth and from perforations at 10,371-90 ft., well tested oil and gas through 8/64-in. choke. Tubing pressure was 2,500 psi. Testing operations will continue on the venture.

Shell Oil Co. is still testing 1 Kirby Lumber Corp. Tract 110-A, wildcat 2¾ miles southeast of Segno production in Hardin County. Although perforations have not been released, the well is flowing 19.6°-gravity crude. On a previous test of perforations at 7,074-81 ft., the well flowed at the rate of 96 bbl. of oil per day. Another test 6,780-87 ft., recovered gas and small amount of distillate under working pressure of 1,760 psi.

Two miles west of Conroe production in Montgomery County, Austral Oil Exploration has opened Yegua production at 1 Katherine Risher Randal et al. From perforations in the Upper Yegua, the well is cleaning 34°-gravity crude. This new discovery is bottomed at 8,248 ft., with 5½-in. production string cemented at 8,247 ft. Location is in Denward James Survey, A-289.

A new dry gas producing area has been established in Goliad County in an area approximately 3 miles southwest of Schroeder. Currie B. Davis 1 Ed Billo, E. de la Pena Survey 31, is flowing dry gas at the calculated rate of 175,000,000 cu. ft. daily on open flow. Production is from perforations at 3,608-12 ft.

In the same county, Sun Oil Co. has extended Yegua production at Weesatche field approximately ¾-mile north. From perforations at 4,673-4,702 ft., operator's 1 W. A. Dohman flowed 45 bbl. of 46.1°-gravity oil daily. Meanwhile, Sun has staked location for 2 A. A. Fromme et al, ¾ mile north of 1 Dohman.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCATS

Bee County: oil discovery—Morris Cannan 1 A. J. Kimball, Henry Coley heirs, Sur. TD 7,567 ft., Wilcox 7,209-13 ft., IP 126 bbl. oil per day, ⅛-in. choke 38° gravity, TP psi.

Colorado County: gas distillate discovery—Robert Mosbacher 1 D. Nebbe, SA& MGRR Sur. A-539, Td 9,250 ft., Wilcox 8,785-98 ft., 8,810-15 ft., IP 8,300,000 cu. ft. of gas per day open flow plus some 64°-gravity distillate.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Bee County: Southern Minerals Corp. 1 Claude E. Heard unit 2, Jeremiah Tool Sur., 8 mi. NE of Skidmore, dry, TD 5,215 ft.

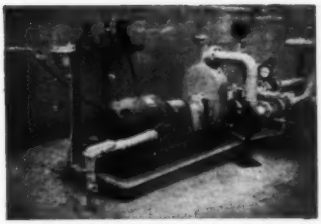
Brazoria County: Falcon Seaboard Drilling Co. et al 1 C. E. Wissner, Francis Moore Sur. A-10, dry, TD 10,424 ft.

Colorado County: J. M. Flaitz 1 C. P. Hogo, G. W. E. Wallace Sur. A-603, dry, TD 10,075 ft.

Fayette County: Justiss-Mears Oil Co. 1 Edw. J. C. Wieshuhn, J. G. Wilkinson League, A-108, dry, TD 6,631 ft.

Fort Bend County: H. C. Cockburn 1 R. F. Ransom, J. Kuykendall Sur. A-49, dry, TD 6,920 ft.

MARLOW pump adds to new refinery efficiency

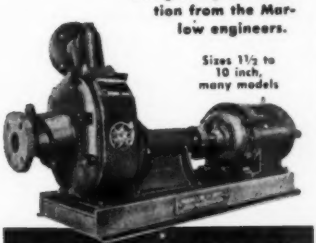


This 3 inch Marlow Self-Priming Centrifugal Model 322 HEL-7 is installed in the pumping station of Cities Service Refining Corporation's big Lake Charles Refinery, Louisiana, which opened early in 1944.

The pump is used in intermittent operation for stripping pipe lines and storage tanks and for removing sludge from pump pit. It's an efficient, virtually maintenance-free installation . . . the kind that helps cut refining headaches.

For many years Marlows have handled oil reliably in many types of installations. A Marlow primes and reprimes automatically. It won't vapor lock and it operates quietly and smoothly because of its free-flow design. Construction is heavier than necessary assuring long life and the utmost in dependability.

Oil men everywhere know the Marlow pump for its ability to solve pumping problems. Your inquiry will get expert attention from the Marlow engineers.



Sizes 1½ to 10 inch, many models

MARLOW PUMPS
544 GREENWOOD AVENUE
RIDGEWOOD, N. J.
Manufacturers of the World's Largest, Most Dependable Line of Self-Priming Centrifugal, Diaphragm and Plunger Pumps

Jackson County: Union Oil Co. of Calif. 2 John M. Bennett, Ramon Musquez Sur. A-59, dry, TD 9,080 ft.

Karnes County: Alex W. Head, Cox, Hamon, and Kirkwood 1 Stella Tips et vir Carlos Martinez Sur., dry, TD 6,678 ft.

Lavaca County: Commercial Petroleum & Transport et al 3 Arthur E. Evans, John J. Mays Sur., dry, TD 5,475 ft.

Matagorda County: The Texas Co. 1 J. C. Lewis et al B. F. Jaques Sur. A-52, dry, TD 12,507 ft.

Victoria County: Monterey Oil Co. 2 Agnes W. Fleming, Francisco Gonzales Hidalgo Sur. A-61, dry, TD 5,110 ft.

Wharton County: Edwin J. Fluss 1 Hilty-Wolcott, W. A. Northington Sur., Lot 1, dry, TD 8,004 ft.

South Louisiana

Terrebonne Parish Wildcat Flows Oil

NEW ORLEANS.—Cities Service Oil Co. and Forest Oil Co. 1 Delta Securities, 37-17s-18e, new strike in Terrebonne Parish, flowed 71 bbl. of 45°-gravity oil and 4,580,000 cu. ft. of gas through 13/64-in. choke. Tubing pressure registered 5,090 psi. and gas-oil ratio was 63,900 to 1. Operators drilled the well to 12,973 ft. and completed through casing perforations at 12,675-85 ft. This new discovery is located 3½ miles northwest of Long Lake field. Five other possible gas producing zones were logged in the venture, but have not been tested.

A 1-mile northeast outpost to Lafitte field, Jefferson Parish, has been completed at The Texas Co. 1 Henry Rojas et al, 14-17s-24e. Through 1/8-in. choke, the well flowed 148 bbl. of 38.5°-gravity oil per day from perforations at 10,495-10,504 ft. Tubing pressure registered 1,050 psi. Hole is bottomed at 11,727 ft.

Testing operations are still underway at Texaco 1 Consolidated Co. et al, 108-7s-8e, outpost well at Happytown field, St. Martin Parish. On latest test of perforations at 10,080-85 ft., the well flowed at the rate of 45 bbl. of 51.8°-gravity distillate per day through 12/64-in. choke. Flow was accompanied by 1,803,000 cu. ft. of gas daily. These perforations were squeezed and operator is preparing to reperforate and run new test.

Houston Oil Co. has abandoned its wildcat in St. John the Baptist Parish, 1 State Lease 1838, after considerable attempts to produce the well. On drill-stem test at 10,984-98 ft., the well flowed salt water under maximum pressure of 5,200 psi. Salt water was also recovered on test of perforations at 9,398-9,404 ft.

Sun Oil Co. has abandoned its deep venture in Chacahoula field, Lafourche Parish, at total depth of 16,027 ft. This wildcat, 35 Dibert-Stark-Brown, 59-15s-15e, was separated from Chacahoula field by a fault line. Deep production was established at 13,800 ft. last year in this field and Sun Co. was attempting to pick up the same sands across the fault line. However, on the same side of the fault line with the deep discovery, Sun is drilling A-1 Lovert and is now at present depth of 13,713 ft.

SOUTH LOUISIANA SUCCESSFUL WILDCAT

Plaquemines Parish: oil discovery on number flank of Washington dome—John W. Mecom - Freeport Sulphur Co. 1 Ernest Cockrell, 35-19s-26e, TD 12,029, perf. 11,872-11,938 ft., IP 195 bbl. oil per day, 13/64-in. choke, 53.9° gravity, TP 3,050 psi.

SOUTH LOUISIANA WILDCAT FAILURES

Acadia Parish: Humble Oil & Refining Co. 1 Charles T. Davis et al, 17-7s-2w, dry, TD 9,505 ft.

Livingston Parish: Progress Petroleum Co., Inc., 1 Livington Lumber Co., 40-7s-5e, dry, TD 9,009 ft.

Combat CORROSION with Johnsonite No. 4 plastic pipe

Johnsonite No. 4, a cellulose - acetate - butyrate extruded plastic pipe, is becoming more and more popular with petroleum people, for good hard-case reasons.

Johnsonite No. 4 is:

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Eastern Texas

Sub-Clarksville Discovery Shows in Wood County

DALLAS.—Trans-Tex Drilling Co. R. F. Walker, Wood County wildcat 3 miles northeast of Quitman, was showing for a discovery in the sub-Clarksville sand. First test on perforations at 4,528-36 ft. pumped 100 bbl. of oil a day, with some water. Operators prepared to squeeze and reperforate.

Jim McMurray, Tyler, was reported ready to drill 1 M. W. Burks as a 5,200-ft. test on a 64-acre tract in the S. C. Shirley Survey, south of Forrest Hill field.

In Marion County, Kemp Drilling Co., Inc. 1 Reed & Bitner, extension test to the Woodlawn gas-distillate field, was reporting coring in the Pettit at 6,620 ft. Field reports indicated the well might be an oil well, of lower gravity than the distillate producers south of it. A drill-stem test in the Pettit at 6,568-6,600 ft., open 15 minutes, recovered 2,700 ft. of oil.

In Freestone County Humble Oil & Refining Co. 1 Fred Marberry, Flint Survey, was coring in the Smackover below 12,675 ft. No shows have been reported below the gas found on drill-stem test at 12,420-508 ft.

Humble 1 First National Bank of Corsicana, deep Navarro County test, was coring ahead at 7,799 ft. Drill-stem test at 6,790-6,844 ft. developed 210 ft. of slightly gas-cut mud in 60 minutes.

Bobby Manziel's Woodbine wildcat, 10 miles east of Palestine in Anderson County, had cored into salt water, around 1,620 ft., according to unconfirmed reports. Several shows of oil had been reported for the well.

EAST TEXAS (DISTRICTS 5 AND 6) WILDCAT FAILURES

Cherokee County: E. A. Ellison 1 Nat Williams, A. Ferguson Sur., dry, TD 5,315 ft.

Nacogdoches County: E. G. Bradham 1 A. C. Irwin, J. W. Pearce Sur., dry, TD 7,375 ft.

Wood County: Jackson & Deupree 1 G. N. York, W. Greer Sur., dry, TD 9,060 ft. A. O. Phillips 1 Mary Saner, Mary Polk Sur., dry, TD 8,264 ft., elev. 352 ft., Paluxy 7,689 ft., Glen Rose 8,102 ft.

DRILLERS! . . . . . OIL COMPANIES! . . . . . SUPPLY COMPANIES!

—Operating in West Texas?

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For Immediate Sale

DOWNTOWN YARD

in Odessa, Texas

- **5.05 Acres**
- **Warehouse and Office Bldg.**
- **Truck and Welding Bldg.**
- **4 Other Bldgs.**
- ***Call or wire . . .***

8 blocks from downtown Odessa! Approximately 11,633 square feet of paved yard, rest caliched, all fenced. Trackage adjoining. 40' x 24' Office and warehouse bldg. air-cooled, galvanized iron. 32' x 20' 4 room frame house. 29' x 20' frame house, 20' x 27' Garage, galvanized iron, with wash and store room. 34' x 76' galvanized iron mechanical shop with 8' x 15' stock room. All bldgs. with toilet facilities. 31' x 79' galvanized iron truck and welding shop, including two room bunkhouse. Yard and buildings are offered complete with pipe racks.

OLSON

DRILLING CO.

5-1123 — 10TH FLR. PET. BLDG. — TULSA

California

New Pool Discovery Made In San Joaquin Valley

LOS ANGELES.—A significant new pool discovery on the southwest flank of the old Wheeler Ridge field, southeastern San Joaquin Valley, has been made by Richfield Oil Corp. The discovery, 85-29 Kern County Land in NE SE 29-11n-20w, on a 3-hour gage produced at the rate of 1,170 bbl. daily from 157 ft. of sand at 9,600-9,757 ft.

The well started flowing 35.3°-gravity crude while circulating out 84-lb. drilling mud. The flow was made through a 17/64-in. choke at a 2,800-psi. tubing pressure and was accompanied by a gas flow estimated at 1,500 M.c.f. daily. The well is believed to be producing from a sand of Eocene age.

Richfield's lease block in the immediate area covers about 2,600 acres. Standard Oil Co. of California which owns much of the shallow production, likewise has substantial holdings. Nearest previous tests of the Eocene, both dry, were Richfield 1 and 2 K.C.L., about ¾ mile to the east and southeast in Sec. 28.

Developments in the northern counties area included abandonment by Richfield of its wildcat in the Maryville-Buttes area of Sutter County and the starting of a second test. The dry wildcat was 1 Butte Core Hole in 4-15n-2e, total depth 4,778 ft. The new test is its 2 Butte Community-A, in 9-16n-2e and about 5 miles northeast of Marysville-Buttes gas production.

At Hospital Nose in Alameda County, The Texas Co. 1 Hancock-Signal-Wente was completed as a 160 M.c.f. gas discovery. Located in 27-3s-2e or about 3 miles southeast of Livermore, the discovery was drilled to 7,062 ft. and plugged back to 5,280 ft.

General Petroleum Corp. was approaching 5,000 ft. at its wildcat northwest of Hollister in San Benito County. The test, 1 O'Connell Ranch, is in NW SW 11-12s-4e. Another General Petroleum wildcat being watched was 44-14 Boston Land Co. in 14-20s-18e, Fresno County. Abandoned about a year ago after drilling to 14,724 ft., the test was redrilled to 13,195 ft. With 4½-in. liner landed at 13,190 ft. the operator was testing shows below 13,131 ft.

Efforts to open new oil production in Cuyama Valley continued to be unsuccessful. At the south Ballinger area of Ventura County, in 10-9n-24w, The Texas Co. abandoned 1 Blue Diamond at 5,875 ft. In the Morales Canyon area, 11-11n-28w, Richfield abandoned 34-11 Ritter-C after drilling to 5,777 ft.

In the Los Angeles area interest chiefly was centered on activity in the upper Santa Clara Valley area. About 3 miles southeast of Castaic Junction field, in 33-4n-16w, Humble Oil & Refining Co. was testing shows at E-1 Newhall Land & Farming. On a test at 8,220-8,311 ft., 1,674 ft. of saltwater with a scum of oil was recovered. Hole was then plugged back to 8,068 ft. where a second test was being made at 7,955-8,068 ft.

Honor Rancho-Castaic Hills developments included Texaco completing 10 Honor Rancho as a 115 bbl. well, in the Sterling sand, and Richfield finishing 13-36 Turney as a 600 bbl. producer. Four other wells

PARKERSBURG

HYRECO

Continuous Improvement Keeps It The Leader In Cold Separation

In mid-1950, after 3 years of field testing, Parkersburg Rig & Reel Company introduced the first commercially successful cold separation unit, the Parkersburg HYRECO. Since then, the HYRECO has been the subject of intensive study by the industry, by Parkersburg, by gas engineers and others interested in increasing condensate recovery from high pressure gas wells.

Parkersburg engineers have carefully checked the performance of every HYRECO put into service. This unrelenting scrutiny of its operation under varying field conditions, severe weather conditions and gas sales requirements has resulted in a number of improvements that make today's HYRECO better than ever before and still the most successful and profitable method of increasing condensate recovery.

If you are concerned with the production of high pressure gas wells, it will pay you to get complete information about the Parkersburg HYRECO. Ask your Parkersburg Representative for facts and figures to prove how these units pay for themselves in a very short time by increased condensate recovery.

1. New inlet deflection arrangement for improved separating capacity.

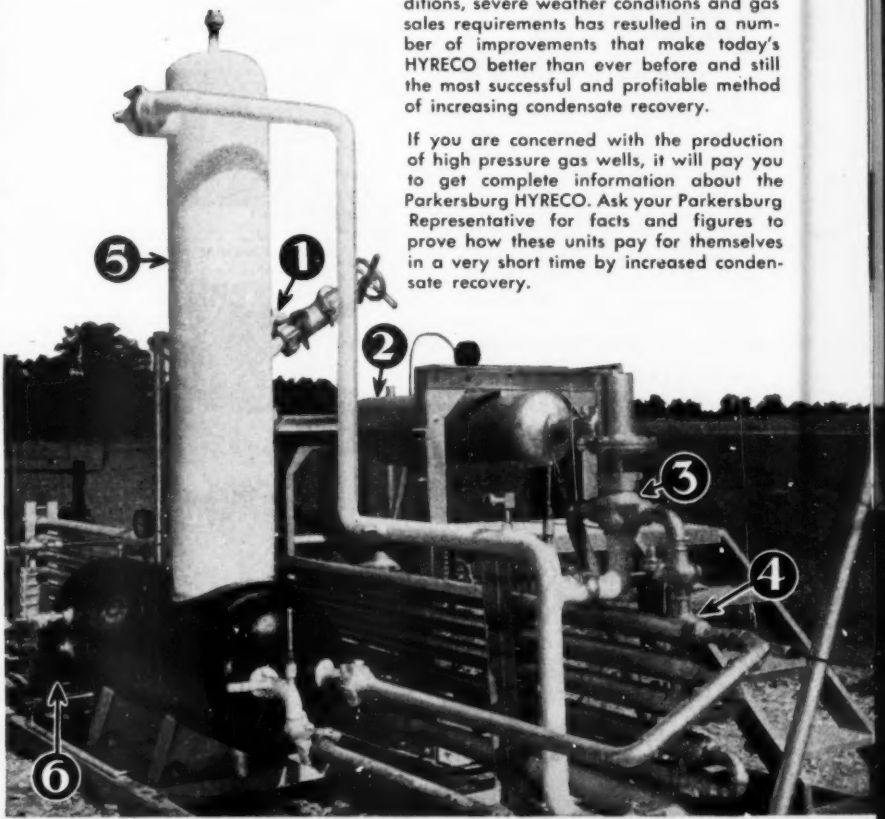
2. Hydracepter combinations are available for either liquid or water knock-out type of operation, or both.

3. A new and exclusively Parkersburg 3-way valve gives dependable temperature control within the Hydracepter.

4. A completely new series of heat exchangers, properly sized for any given job.

5. New 5000 MCF high recovery separator has 40% greater height to provide greatly increased separating efficiency.

6. All internal parts of Parkersburg's exclusive No-Bleed Liquid Level Controller, except the float, are completely submerged in warm liquid to eliminate cold weather control problems.



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there were in the process of being completed.

CALIFORNIA SUCCESSFUL WILDCAT

Kern County, ¼-mile north extension to Kern Front field: G. H. Cherry 1 U.S.L., SE NE 2-28s-27e, pumped 22 bbl. daily through perforations at 1,331-1,385 ft., 15.4°-gravity crude, 22 per cent cut, TD 1,440 ft.

CALIFORNIA WILDCAT FAILURES

Kern County, Comanche Point area: M. G. Kovaleski 1A Flowing Gold, 27-12n-18w, dry, TD 865 ft., elev. 1,016 ft.

Devils Den area: Lee Clayton 1 "Well," 2-26s-18e, dry, TD 440 ft.

Kern Bluff area: Standard Oil Co. 1 Fee core hole, 19-29s-29e, dry, TD 1,833 ft., elev. 827 ft.

McDonald Anticline area: Ferguson & Bosworth B-1 Layman, 17-28s-29e, dry, TD 2,923 ft.

Richfield Oil Corp. 1 Miller & Lux Fee B, 20-28s-20e, dry, TD 2,490 ft., elev. 1,013 ft.

Tejon Hills are: Hetman-Can Explor. Co. 2 "Well," 9-11n-18w, dry, TD 600 ft., elev. 986 ft.

Los Angeles County, Newhall area: R. E. Bering 1 Atwood, 10-3n-16w, dry, TD 6,134 ft., elev. 1,430 ft.

Northridge area: Richfield Oil Corp. 1 Mulholland, 28-2n-16w, dry, TD 6,669 ft., elev. 810 ft.

Puente area: Richfield Oil Corp. 1 Peel, 10-2s-10w, dry, TD 2,206 ft., elev. 409 ft.

San Luis Obispo County, Temblor Range area: Canon Drilling Co. 2 Elk Horn, 27-32s-22e, dry, TD 1,820 ft., elev. 2,541 ft.

Sutter County, Marysville Buttes area: Richfield Oil Corp. 1 butte core hole, 4-15n-2e, dry, TD 4,778 ft., elev. 115 ft.

Ventura County, Reyes Peak area: Standard Oil Co. 1 Hattie Russell, 11-6n-23w, dry, TD 9,748 ft., elev. 6,806 ft.

Simi area: British American Oil Producing Co. 67-1 Binns, 1-2n-19w, dry, TD 3,626 ft., elev. 683 ft.

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★ SAVES DRILLING COSTS

Southwest Texas

Vicksburg Strike Being Completed in Jim Wells

CORPUS CHRISTI.—Two miles southeast of Sandia in Jim Wells County, H. H. Howell 1 J. E. McClaugherty is being completed as a new Vicksburg oil strike. On drill-stem test in open hole at 5,250-5,320 ft., recovery was 225 ft. of pipe line oil and 50 ft. of oil-cut mud. Sand with good oil odor and fluoresence was cored from the Vicksburg at 5,250-67 ft. An oil sand was also cored from the Frio at 4,363 ft. Operator is setting 5½-in. casing at total depth of 5,320 ft. prior to completing the venture. Location is in J. B. Dibrell subdivision of Casa Blanca Grant, Block 64.

Queen City oil production is being opened in Duval County 3 miles northwest of Freer at Sun Oil Co. 94 Wiederkehr, J. Poitevent Survey. On 20-minute drill-stem test at 5,409-17 ft., using ¼-in. chokes, recovery was 1,034 ft. of clean oil. Bottom-hole flowing pressure was 905 psi. Top of the Queen City was reported at 5,410 ft. Operator is setting casing from completion attempt. This is reported to be the first Queen City production in this part of the county, the closest being at Little Alamo field. The venture was originally started as a Wilcox test, however, Sun Co. decided to complete in the Queen City, and is scheduled to drill another Wilcox test.

Phillips Petroleum Co. A-1 J. O. Washburn, McMullen County wildcat near Green Branch field, is coring below 14,200 ft. Cores have been taken from various depths in the venture, however, no shows have been reported.

A possible new San Patricio County gas discovery is testing 2 miles northwest of Mathis at Daubert & Achning 1 A. Soehnge. This venture flowed an ungaged amount of gas from perforations at 4,024-28 ft. under flowing pressure of 1,280 psi. Operator is now attempting to complete the well, which is located in Block 11, M. P. J. & N. Delgado Survey, Schliecher & Joseph subdivision.

The second producer in the new Crestonia field, Duval County, has been completed at Pontiac Refining Co. A-1 Leroy Denman. The well flowed 55 bbl. of 40.2°-gravity oil daily from the upper Hiawatha cated one location south of the field c.ssand at 5,039-46 ft. This new oiler is locovery well. Meanwhile, the same operator is drilling below 2,000 ft. at a west offset to the new well. Venture is A-2 Leroy Denman is projected to 5,200 ft.

Standard Oil Co. of Texas is rigging up to drill 1 Ildefonso Ramirez, et al, a projected 15,000-ft. wildcat 5 miles southeast of Lopena in Zapata County. Venture is located in Lot 6, Jose C. Ramirez Survey, Abstract 76.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCAT

Bell County: oil discovery—Pryor Dillard B-1 A. H. Safford, Wm. Woodford Sur., TD 1,338 ft., Buda lime 1,090-1,103 ft., IP 9 bbl. oil per day on pump, 22.5° gravity.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Atascosa County: Alaska Steamship Co. 1 C. T. Miers, Henry Heiner Sur., 521, dry, TD 1,600 ft.

J. D. Hedley 1 A. N. B. Carnes, Joseph Wichl Sur., A-917, dry, TD 5,900 ft.

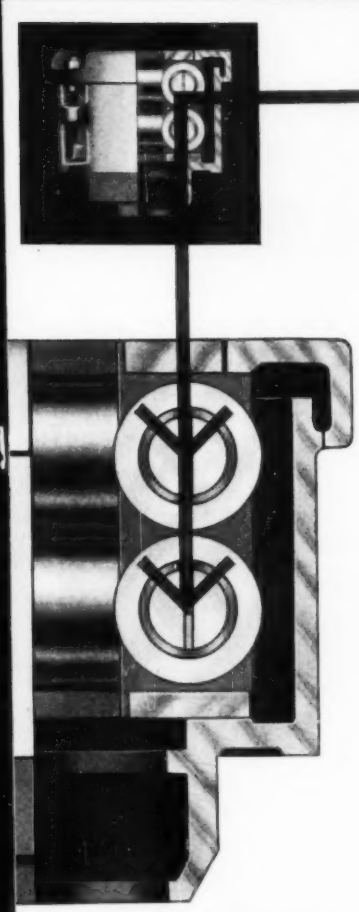
J. D. Hedley 1 E. A. Kinsel, G. B. Tankersley, Sur. 388, A-261, dry, TD 4,510 ft.

Duval County: John F. Camp & Son & Edwin L. Cox 1 Leila Peters, J. M. Tigert Sur. 321, A-2021, dry, TD 4,012 ft.

Hawn Bros. et al 1 A. A. Cantu, P. Alamis Sur. A-1693, Sec. 564, dry, TD 2,828 ft.

Southern Minerals Corp. & Taylor Refining Co. 1 John M. Luby, N. G. Collins Sur., 2, dry, TD 4,180 ft.

Frio County: Kirkwood & Morgan 1 Lee M



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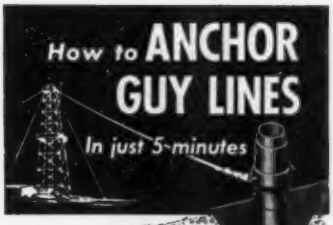

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Dugger, L. I. M. & C. Co. Sur. 11, A-464, dry, TD 5,545 ft.

Gonzales County: Daubert & Achning 1 W. A. Bradley, A. M. Grenage Sur. A-222, dry, TD 2,520 ft.

Jim Hogg County: Armstrong & Cotton et al 2 Down Royalty Corp., El Javali Grant, Beer & Coffee Subd., Blk. 36, dry, TD 2,410 ft.

Wilson County: Leveridge Bilbo & Redding et al 1 W. E. Hardin, A. Green, A-275, dry, TD 2,841 ft.

Zapa County: Miller & Pierce 1 Alfonso Garcia, Charco Redondo Grant, Hoffer Subd., Blk. 14, Share B, dry, TD 1,301 ft.

Louisiana-Ark.

New Producing Zone Opened Near Springhill

SHREVEPORT.—McCalman-Gunn Drilling Co. is waiting on pump before completing 1 Boucher estate, 17-23n-11w, 2½ miles southwest of Springhill, Webster Parish.

The well is estimated to be able to produce about 30 bbl. of oil daily from perforations 2,700-04 ft. in the Buckrange zone of the Blossom sand. The wildcat was drilled to 3,104 ft. in the Tokio but after finding no shows was plugged back to the Buckrange for completion.

Operators are setting surface pipe at 1 C. C. White estate, 860 ft. from north line and 200 ft. from east line of NE NE 20-23n-11w, an offset and confirmation to the new discovery.

Barnett Serio Drilling Co. has completed 1 A. M. Burrell, 4-6n-7e, Concordia Parish, to flow 188 bbl. of 39.5°-gravity oil daily from perforations 5,094-98 ft. in upper Wilcox sand. The wildcat is located 2¼ miles northwest of Lisemore Landing field. The production tapped by the 1 Burrell is not believed to be from the same reservoir as the Wilcox production in both Lisemore Landing and Willow Lake fields.

When and if these two discoveries are designated as new fields northern Louisiana's 1952 total will be 6 new discoveries. The other new fields this year are: Helena field, Tensas Parish, Rock Point, Caddo Parish, Springhill field, Webster Parish, and Summerfield, Claiborne Parish.

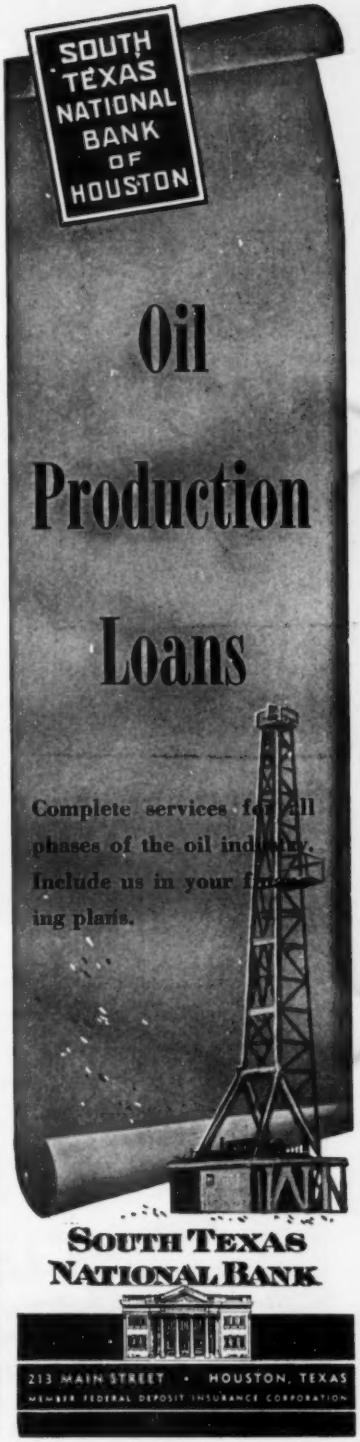
A roar heard for miles was reported when Feazel Interests and Monla Gas Co. 1 Breece Lumber Co., 113 ft. from south line, 165 ft. from west line in NW 3-18n-5e, blew out more than 1,000 ft. of tubing.

The wildcat, an indicated discovery of a new Cotton Valley gas-condensate reservoir, is located 1½ miles east and north of Swartz townsite, Ouachita Parish. Operators cemented 5½-in. casing to 7,525 ft. and perforated between 7,330-75 ft. in Bodcaw sand of the Cotton Valley formation. The well has been brought under control by pumping mud into the hole. String will be re-run for completion. When the well is completed Cotton Valley gas-condensate production will be extended 28 miles to the east in northern Louisiana, marking the third new gas field in the area since January 1.

Arkansas.—Gulf Refining Co. is having difficulties at 1 Stonecipher-Foster unit, 15-19s-21w, Columbia County, a confirmation well of Pettit production in new Horsehead field.

After flowing 2 hours with recovery of oil flush, the well died and then was swabbed for 15 hours with recovery being 1 bbl. hourly of spent acid water and no shows. The well is bottomed at 5,916 ft. and plugged back to 5,873 ft., perforated between 5,816-24 ft. and 5,826-32 ft. in Pettit. The well was acidized with 2,000 gal. of acid. A 20-minute drill-stem test, while drilling, of 5,817-66 ft. recovered 30 ft. of oil-cut mud on ¼-in. top and ⅜-in. bottom chokes with a slight blow at surface.

Shell Oil Co. has completed 3 Browning-Burns unit, a new Tokio oil well in Spring-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hill field, Columbia County, in 12-20s-23w. This is the third Tokio oil well on the Arkansas side of the new field.

LOUISIANA SUCCESSFUL WILDCAT

Concordia Parish: Barnett Serio et al 1 Burrell, C NE SW 4-6n-7e, flowed 188 bbl. of 39.5°-gravity oil from Wilcox 5,094-98 ft., TD 6,307 ft.

LOUISIANA WILDCAT FAILURE

Caddo Parish: Cummings & Spellisy 1 F. A. Baker, 2,310 ft. N and 893 ft. W SEc 35-17n-16w, dry, TD 4,019 ft.

ARKANSAS WILDCAT FAILURE

Lafayette County: The Texas Co. 1 USM, 660 ft. N and E of SWc 15-19s-24w, dry, TD 6,816 ft.

Canadian Fields

Gas Discovery Made at Saskatchewan Venture

CALGARY.—Albercan Oil Corp., subsidiary of Canada Southern Oils, Ltd., discovered natural gas and found some oil-cut mud during drill-stem tests in the Viking sand at its 1 Eureka stepout venture 2½ miles east of Coleville heavy crude oil producers, in central west Saskatchewan.

The well, Canada Southern-Eureka, on SW¼ Section 22-31-23w3, contacted the Viking at 2,250 ft., and found oil staining in cores. One-hour drill-stem test in the Viking interval 2,247-57 ft. gave a gas flow to the surface in 30 seconds, at rate 768,000 cu. ft. daily, and recovered 40 ft. of oil-cut mud. Second test, from 2,249-72 ft., flowed natural gas to surface immediately, at rate 1,170,000 cu. ft. daily. One hour pipe recovery was 90 ft. of gas and oil-cut mud. Crew is now preparing to drill ahead.

Natural gas and some naphtha was found at an exploratory venture being drilled on an 80 acre farmout some 3 miles west of Leduc field, during drill-stem test in the D2 zone of Devonian. The drilling group includes Northern Development Co., Ltd., Amalta Oils, Ltd., and Concord Development, Ltd., who obtained rights on an 80 acre tract from the Red Deer Syndicate.

The well, on LSD 8 17-50-27w4, ran a 70-minute drill-stem test of interval 5,334-46 ft., and flowed natural gas in 2 minutes, at rate 2,160,000 cu. ft. daily. Pipe recovery was 30 ft. of naphtha. Crew is currently coring ahead prior to running further tests. Before reaching D2 the well also found natural gas in rate up to 2,000,000 cu. ft. daily during tests in the Lower Cretaceous.

The team of Punch Petroleums, Ltd., and Rio Tinto Alberta Oils, Ltd., has found oil and natural gas encouragement at its second structure test well in the Northwest Territories. This second venture is located about 2½ miles northwest of the team's first 'slim' hole which found oil saturation during early March.

The Punch-Rio Tinto project is located in the Great Slave Lake area of the Northwest Territories, about 120 miles southwest of Yellowknife, 70 miles north-northwest of Hay River and 130 miles north of the Alberta border.

Slim Hole No. 2 contacted the Slave Point limestone around 787 ft., about 422 ft. lower than the team's first venture. Crew found a fair gas show, porosity and spotty to fair oil saturation in the cores. Crew is still in the limestone and is making hole below 850 ft.

The Pacific Petroleums Group has obtained a moderate showing of natural gas at its exploratory well in the Flathead Valley area of southeast British Columbia. The well, Pacific-Atlantic 1 Flathead, is located about 125 miles south and slightly west of Calgary, and is about 25 miles west of Pincher Creek, being separated from that major 'wet' gas field in southern Alberta by a range of the Canadian Rocky Mountains.

The Flathead 1 ran drill-stem test in an unidentified sand section from 5,411-37 ft. and received a maximum natural gas flow rate of 250,000 cu. ft. daily. When drill pipe was pulled it was found to contain 30 ft. of sulfurous watery mud. Drilling is continuing below 5,477 ft.

CANADIAN WILDCAT FAILURES

Union-Texaco-Ashley 1 Pipestone Creek, LSD 10 13-47-25w4, TD 6,511 ft.

Bashaw Leduc 1, LSD 9 19-41-22w4, TD 5,590 ft.

Amalta - Luzon, LSD 7 11-55-16w4, TD 3,512 ft.

Appalachian-Ohio

West Virginia Reports All Appalachian Completions

PITTSBURGH.—In Triadelphia district, Logan County, West Virginia, United Producing Co., Inc., completed 32-1896 Pardee Land Co., with an open flow of 1,808,000 cu. ft., gas, Berea sand, TD 3,621 ft. Williamsburg district, Greenbrier County, Deep Rock Oil Corp. 1 Bertha H. Thornbury et al, elevation 2,420 ft., is drilling at 5,999 ft. Walker district, Wood County, Hope Natural Gas Co. 9634 Power Oil Co., elevation 1,039 ft., is drilling at 4,319 ft. The Oriskany sand was reached at 4,307 ft., and had salt water 4,307-4,310 ft. Portland district, Preston County, Hope Natural Gas Co. 9673 Nina Kay is again drilling and is at a depth of 5,704 ft.; No. 9676 Sarah J. Creamer is drilling at 5,671 ft. Manufacturers Light & Heat Co. 4116 Enzer & Annie E. Whitehair is at 5,370 ft. St. George district, Tucker County, Lawrence Parshall 1 Floyd Stahl et al, is now drilling at 2,767 ft.

Maryland.—Garrett County: No completions or new work were reported during the past week. Drilling activity in this area has reached the stage where almost all drilling has been shut down. Some are due to lack of the casing needed to proceed and others to unfavorable results in adjacent

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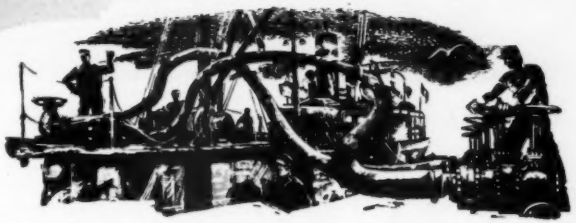

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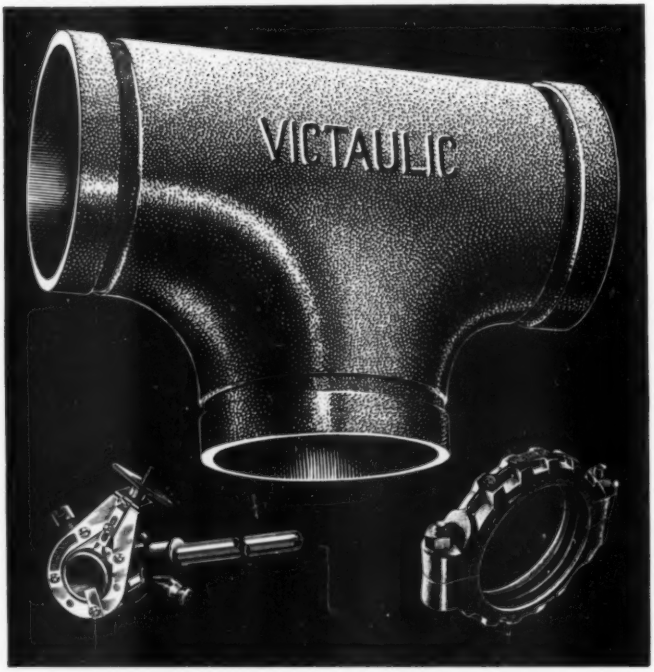

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drilling. At the present time, twenty-one wells are reported in various stages of operations.

Southwest Pennsylvania. — Unity Township, Westmoreland County: Peoples Natural Gas Co. 4003 A. J. Dotterway, elevation 2,094 ft., is drilling at 7,925 ft. No. 4008 J. R. Frola, is spudding in.

OHIO

John Morrow et al. 1 Ernestine Leonhart, Lot 11, New Castle Township, Coshocton County, ⅝ mile north of production, will make a small producer. Clinton sand at 3,245-3,300 ft. made a small oil showing natural that increased to an estimated 20 bbl. in 24 hours after an 80-qt. shot.

At the extreme west end of the Bladensburg pool in Jackson Township, Knox County, Shuff and Bucy brought in a very nice well on the 1 Otis Boggs, Section 6. Clinton at 2,725-76 ft. made 10 bbl. natural and 140 bbl. in 24 hours after shot. At the east end of the pool, Mossholder Drilling Co. 2 R. C. Hall, Section 8, gaged 190,000 cu. ft. and a show of oil natural and 300,000 cu. ft. at the end of 48 hours.

Carrick, Hurst and Dittoe extended the Baker pool, in Hopewell Township, Perry County, with a nice well on 11 Mary Walser, Section 27. Clinton sand at 2,936-78 ft. made 20 bbl. natural that increased to 100 bbl. in 24 hours after a 90-qt. shot.

Mississippi

Gas Tested at Forrest County Wildcat

JACKSON.—Approximately 6 miles east and slightly north of Pistol Ridge gas field, Forrest County, Ohio Oil Co. 1 Coleman-Powe, 5-1s-12w, has cored and drill-stem tested gas in first sand development below base of Chalk. A core was cut from 7,192-97 ft., with 4 ft. having odor and taste of gas. Another core was cut at 7,197-7,200 ft. with recovery being only 6 inches of silty sand with slight odor. A drill-stem test was then run at this interval, using ¼-in. bottom and ⅛-in. top chokes. On 10-minute test, top pressure built up to 320 psi. and recovery was water cushion cut with gas and condensate and 60 ft. of mud cut with condensate. Bottom hole pressure was 2,190 psi. Another drill-stem test was conducted at 7,200-07 ft. and the tool was left open for 20 minutes. At the end of this time, surface pressure had reached 500 psi. Recovery was gas-cut water cushion and one stand of condensate. Coring has been continued on all drill breaks, but no more permeable sand has been countered.

Gulf Refining Co. 1 H. A. Chapman, Sr., "A," 19-10n-6w, Wayne County oil discovery is still waiting on completion gage. Well flowed at the rate of 305 bbl. of 38.5°-gravity oil daily through 10/64-in. choke with tubing pressure of 450 psi. Production is from perforations in the Lower Cretaceous at 9,595-9,608 ft. This new field has been designated Hiwannee. It is one of 4 wells in Mississippi producing from this geological age.

Lion Oil Co. is fishing for drill-pipe and core barrel in 2 Denkmann, 22-7n-4e, Smackover wildcat in Rankin County, Miss. Pipe was stuck while coring at 16,276 ft., and has now been backed off at 15,245 ft. and operators are now washing over and cutting. It is reported that 97 ft. of pipe was recovered on first cut.

Three miles northwest of the town of Harperville, Southeastern Drilling Co. et al, is moving in rig to drill a 12,000-ft. Smackover wildcat in NE NE 19-8n-8e. Venture is 1 Lucy D. Eley et al. Well will be drilled approximately 500 ft. into the Smackover formation. It is believed that this sand underlies the venture, Carter Oil Co. failed to encounter this formation in 1 Denkmann,

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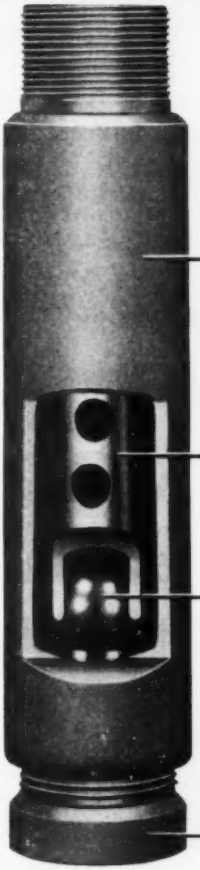

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SW SW 31-11n-7e, which went directly from the Cotton Valley into Paleozoics with both the Buckner and Smackover zones absent. The Denkmann well is approximately 16 miles to the northwest of the new test.

MISSISSIPPI WILDCAT FAILURE

Perry County: Continental Oil Co. 1 Board of Supervisors, 16-1s-10w, dry, TD 12,525 ft.

ALABAMA WILDCAT FAILURE

Monroe County: Creslenn Oil Co. 1 Swift-Hunter Lumber Co., 31-7n-7e, dry, TD 5,145 ft.

Permian Basin

South Offset Located At Andrews Discovery

MIDLAND.—Phillips Petroleum Co. 1-EE University, Andrews County Ellenburger discovery, had logged 315 ft. of pay, and operators had location made for a second test as a south offset, projected to 11,000 ft.

Last reported drill-stem test at the 1-EE University was from 10,925-70 ft. Water blanket flowed in 35 minutes and oil in 50 minutes. It was cleaned into pits for 8 minutes, then gaged 78.4 bbl. of 44°-gravity oil in 1 hour through $^{5}/_{8}$-in. choke. Open flowing bottom-hole pressure was 1,375-3,850 psi.

In Midland County, The Texas Co. 3-A Scharbauer, wildcat 12 miles southwest of Midland, flowed 16.5 bbl. of oil in 2 hours on a drill-stem test at 10,350-490 ft., in Strawn lime.

Tex Harvey Oil Co. drilled its 1-16 Floyd, original discovery of Tex Harvey Spraberry field, to a new total depth of 12,063 ft., 10 ft. in the Ellenburger, then tested back up the hole and was scheduled to complete as a Pennsylvanian discovery.

Casing perforations, at intervals, were from 10,205-800 ft. The well was reported to have flowed 150 bbl. of oil a day for 3 days, and died. It was swabbed in again and was said to be making about the same amount of oil. The Devonian, topped at 11,174 ft., also showed possibilities of production. Original completion was for 135 bbl. of oil a day from the Spraberry at 7,865-75 and 8,045-55 ft.

Scurry County was back in the news with new Strawn production at two wells. In northeast Scurry, The Texas Co. 198 Fuller completed on the pump for 130 bbl. of 33°-gravity oil, plus some water. Pay section was perforated from 7,110-20 ft. Location is 21_{2} miles east of Canyon production.

McAlester Fuel Co. 1-A Allen continued testing on perforations at 7,449-51 ft. In 33 hours the well gaged 267 bbl. of oil, with no water.

Stanolind Oil & Gas Co. 14 Dora Cunningham, Strawn test on the southwest side of Cogdell field, Kent County, found the Canyon dry, then drilled ahead to the Strawn, topped at 7,496 ft., minus 5,055 ft. Drill-stem test from 7,453-7,518 ft. recovered 1,200 ft. of heavily oil and gas-cut mud, plus some salt water. Second test from 7,508-50 ft. had flowing oil in 28 minutes. When drill pipe was pulled, it had 390 ft. of water on bottom. Casing was set on bottom at 7,550 ft. and perforated from 7,506-20 ft. At last report the well had flowed acid residue and some new oil, with no estimates on the amount. The Strawn top was correlated 82 ft. high to the nearest Strawn producer, some 5 miles north.

In Runnels County, Geochemical Surveys 1 G. M. Wood completed for a flowing potential of 322 bbl. of 44°-gravity oil, through 20/64-in. choke from perforations at 3,843-47 ft. The upper Gardner sand discovery was designated as opener of South Crews field.

In northeastern Runnels County, south of Lawn, T. D. Humphrey 1 J. L. Elkins developed 3,800 ft. of gas and 35 ft. of heavily oil and gas-cut mud. Shut-in pressure was 1,100 psi.

M. A. Grisham 1 Fee, gas discovery in Culberson County, gaged approximately 9,500,000 cu. ft. of gas a day, based on a 2-hour open flow test. Operators were moving off rig for further testing. El Paso Natural Gas Co. was reported laying a line in to the well.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCATS

Gaines County: Hitchcock & Sons 1-A Proctor S. Dunbar, 5-A28-PSL, TD 7,264 ft., elev. 3,548 ft., San Andrews 4,304 ft., pay 4,310 ft., IP 158 bbl. 31°-gravity oil, TP 300 psi., GOR 1,920 cu. ft.

Hockley County: L. F. Oil Co. 1 Henry Mahoney, 53-P-C&M, TD 5,947 ft., elev. 3,376 ft., Clear Fork 5,743 ft., pay 5,822 ft., IP pumped 39 bbl. 26°-gravity oil.

Runnels County: American Trading & Production Co. 1 P. R. Deitz, Blk., 15, N. Travis Sur., TD 2,555 ft., perforated 2,550-55 ft., IP 157 bbl. 46°-gravity oil, 32/64-in. choke, GOR 414 cu. ft., TP 40 psi.

Murray Petroleum Co. et al 3 R. T. and R. L. Williams, L. D. Counts Sur. 2, TD 4,277 ft., elev. 2,230 ft., Gardner pay 4,233 ft., IP 74 bbl. 42°-gravity oil, 12/64-in. choke, GOR 1,269 cu. ft., TP 225 psi.

Tom Green County: The Texas Co. 1 Isaac Funk, 10-5-H&TC, TD 855 ft., pay 853 ft., IP pumped 29 bbl. 34°-gravity oil.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Crockett County: Anton Oil Co. 1 University, 8-51-University, dry, TD 2,481 ft.

King County: Continental Oil Co. 4 Mary Martin, 175-F-H&TC, dry, TD 4,877 ft. Dothan 3,360 ft., Canyon reef 4,703 ft.

Humble Oil & Refining Co. 78-3 Bateman, 44-A-R. M. Thomson Sur., dry, TD 5,400 ft.

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Reagan County: E. F. Ray and Dave Harris 1 C. H. Sugg, 35-A-TCRR, dry, TD 6,069 ft., elev. 2,531 ft.

Runnels County: C. U. Bay 1 O. O. McWilliams, Geo. Hill Sur. 324, dry, TD 3,936 ft., Morris sand 3,482 ft. Geochemical Surveys 1-V J. W. Harris, J. V. Cabrera Sur., Blk. 514, dry, TD 3,939 ft., Capps 3,578 ft.

Tom Green County: Humble Oil & Refining Co. 1 Mary B. Hall (hole No. 2), Sec. 27, Washington Co. RR Sur., dry, TD 6,000 ft., elev. 2,029 ft., Srawn 4,942 ft.

SOUTHEASTERN NEW MEXICO

Hassie Hunt Trust 1 Manry-Elliott, Chaves County wildcat in 22-11s-31e, had prospects of discovery production from the lower Pennsylvanian, on the basis of two drill-stem tests.

Details had not been reported, other than a recovery of gas and 42°-gravity oil, on test from 10,487-930 ft. Second test, from 10,868-988 ft., open 4 hours, had gas in 15 minutes, with wet gas in 15 minutes. Volume was estimated at 5,000,000 cu. ft. daily, plus a yield of 25 bbl. of 52°-gravity oil.

In Lea County, Champlin Refining Co. and Harry Bass Drilling Co. completed their 1-A State, 32-10s-37e, for a daily potential of 788 bbl. of 40°-gravity oil. Flow was through ¼-in. tubing choke from open hole at 11,631-725 ft., in the Devonian. Location is about 3 miles west of The Texas Co. 1-AR State, recently completed Devonian discovery.

Phillips Chemical Co. 1 State, wildcat in 4-15s-32e, was drilling ahead following a test at 9,721-95 ft. in the Wolfcamp. Recovery in 3 hours was 276 ft. of gas-cut mud, 920 ft. of heavily oil and gas-cut mud and 186 ft. of free oil, plus 90 ft. of sulfur water.

Another old and shallow area was scheduled for deep exploration. Gulf Oil Corp. staked location for 1 Federal-General American in 24-17s-29e, in Grayburg-Jackson field of Eddy County. Proposed depth was 13,500 ft. to test the Ellenburger.

SOUTHEAST NEW MEXICO SUCCESSFUL WILDCATS

Lea County: Jackson, Dauglas & Ritchie 1 State, 27-10s-32e, TD 10,189 ft., elev. 4,338 ft., top pay 8,390 ft., IP 240 bbl. 45°-gravity oil, 16/64-in. choke, P 325 psi., GOR 949 cu. ft.

Phillips Petroleum Co. 1-B Pello, 20-14s-32e, TD 10,299 ft., elev. 4,355 ft., top pay 9,564 ft., IP 178 bbl. 40°-gravity oil, ½-in. choke, TP 125 psi., GOR 1,560 cu. ft.

Oklahoma

Deeper Pay Uncovered in New Carter County Pool

SINCLAIR OIL & GAS CO. has uncovered a deeper, and what appears to be a potentially more prolific producing horizon for the new pool it recently opened in the area about 4½ miles northwest of Ardmore, in Carter County. Discovery well of the new pay zone, Dornick Hills sand is 1 W. J. Brown, C SW NW 20-4s-1e, a 40-acre east offset to the pool's discovery well, 1 Pruitt, completed last month as a Deese sand producer with pay at 2,246-66 ft.

The present well, started as a 10,000-ft. exploratory test, topped the first Dornick Hills sand zone at 5,318 ft. and a lower sand in the same section at 5,586 ft. Four drill-stem tests have been made as this is written. The first, taking in an interval at 5,322-52 ft. in the top of the pay, recovered 25 ft. of clean 37.2°-gravity oil. The second test, made of a slightly deeper interval at 5,360-77 ft. filled 4,650 ft. of clean oil in 85 minutes. The third test, made in the lower sand zone at 5,590-5,625 ft., yielded 885 ft. of clean oil and 150 ft. of heavily oil and gas-cut mud with tool open 2

hours. The fourth test, made at 5,645-74 ft., started flowing gas within 5 minutes and oil within 40 minutes. Oil flow was estimated at 25 bbl. per hour with a gas-oil ratio of 500 cu. ft. per barrel.

Magnolia Petroleum Co. has encountered promising oil showings in Springer sand at its 1 Sarah Addison, C SW NW 13-4n-5w, first confirmation test for the company's southeast Bradley field, Grady County, opened earlier this year. The Springer pay was topped at 9,460 ft., and in a 60-minute drill-stem test of an interval at 9,566-9,627 ft., the well filled 720 ft. of oil and 610 ft. of oil-cut mud. Flow pressure gaged 1,050 psi. and shut-in bottom-hole pressure 2,500 psi. Hole at latest report was being cored ahead. This well is a south offset to the discovery producer, 1 Woodruff, completed in Hart sand at 8,960-92 ft. The latter well, drilled to 10,019 ft., had showings in the Springer sand but failed to produce when this sand was tested at 9,392-9,422 ft.

Woodward & Co. and Mendota Oil Co. are opening a new deep pool in northeast McClain County at their 1 Connor, NE SE SW 11-7n-3w, which flowed an average of 47 bbl. of clean oil per hour through ½-in. choke during an initial 5-hour production test with casing perforated at 9,233-9,310 ft., opposite Bromide sand. The Bromide is the uppermost of at least three virtually assured productive zones found in the well, drilled to a total depth of 10,206 ft. in Arbuckle lime. Other potential pay zones include the Tulip Creek, topped at 9,567 ft., and Joins, topped at 10,060 ft. Drill-stem tests in these zones got good oil flows. The well is on a Southern Producing Co. farmout, located 1½ miles north of Washington, and 2 miles south of the Southwest Goldsby field, and about the same distance east of the Washington pool. Operations lready are under way at a 40-acre north offset, 1 S. M. Follis, being drilled by the same companies.

The comparatively new West Central School pool, 3 miles southeast of Coyle, Logan County, is being extended ¾ mile southeast by Fordee Rhoades Oil Co. and Aberdeen Petroleum Co. at their 1 Miscura Allen, SE NE SW 27-17n-1e. From open hole at 5,091-5,108 ft. in second Wilcox sand, producing zone of the above pool, the well flowed 565 bbl. of clean oil in 24 hours through ¾-in. choke while completing. In the field, O'Rourke-Baker Drilling Co. and Sunray Oil Corp. have completed another good well. Their 3 Wallace, SW SE SW 22-17n-1e, two 10-acre locations east of the discovery well (1 Wallace), flowed 100 bbl. of clean oil in 14 hours through ¼-in. choke.

A Logan County wildcat, Davidor & Davidor 1 Harned, NE SE SE 4-15n-2w, 4 miles south of Guthrie, has encountered promising oil showings in both the upper Cleveland sand and the Bartlesville sand, but is drilling ahead to the Wilcox. A 90-minute drill-stem test at 4,888-4,920 ft. in the former sand got gas in 60 minutes and recovered 150 ft. of oil and 20 ft. of heavily oil and gas-cut mud. A 60 minute test at 5,520-30 ft. in Bartlesville sand, topped at 5,526 ft., flowed gas in 2 minutes and sprayed oil in 27 minutes. Gas flow was

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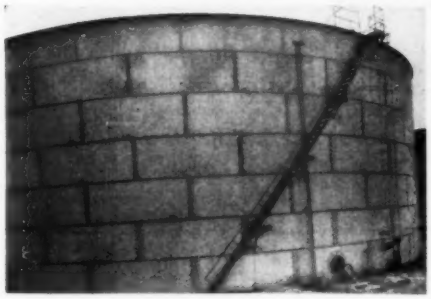

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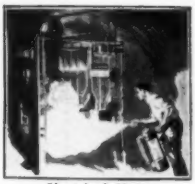

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estimated at 5,000,000 cu. ft. per day. Recovery in the breakdown was 120 ft. of oil.

OKLAHOMA SUCCESSFUL WILDCAT

Kay County: Midstates Oil Corp. 1 Curry, NW SW NW 17-28n-2w, flowed 303 bbl. of 43.3°-gravity oil from Simpson 4,956-62 ft., TD 4,681 ft. (extends NW Doe Creek).

OKLAHOMA WILDCAT FAILURES

Beaver County: Sunray Oil Corp. 1 Meyer, C NW SW 16-1n-21ecm, dry, TD 8,792 ft.

Cotton County: D. H. Bolin 1 Wilkins, SE SE NW 3-1s-10w, dry, TD 2,840 ft.

Garvin County: The Texas Co. 1 Dorothy Edwards, SE SW NE 27-1n-3w, dry, TD 5,306 ft.

Grant County: Service Drilling Co. 1 Page, NW SW SE 32-26n-5w, dry, TD 6,073 ft.

Jefferson County: Fred Schonwald-Christie & Stewart 1 Dennis, SW SW SE 14-6s-5w, dry, TD 3,491 ft.

Kiowa County: H. O. Pope and Rainey Oil Co. 1 Kate Rushton, NW NW SE 6-5n-14w, dry, TD 851 ft.

Gulf Oil Corp. 1 Haxton, NW NE NE 11-7n-16w, dry, TD 5,994 ft.

Lincoln County: Champlin Refining Co. 1 Payne, NW NW SW 12-13n-4e, dry, TD 3,985 ft.

C. P. Qinlan 1 Cook, SE SE SE 6-16n-6e, dry, TD 3,50 ft.

Logan County: Zephyr Petroleum Co. 1 Cravens, NW NW NW 17-18n-2w, dry, TD 6,181 ft.

Murray County: Loy C. Masters 1 Littleton, NE NW SE 31-1n-3e, dry, TD 825 ft.

Kansas

Fifth Oil Discovery for Gove County Indicated

DISCOVERY of another oil pool, the fifth in Gove County at the northern extremity of the Hugoton embayment west of the Central Kansas Uplift, in the far western part of the state, appears to have been made by B & R Drilling Co. of Wichita and Davis Brothers of Tulsa at their 1 Johnson, NW NW NW 31-13-28.

The prospective new discovery well found indicative oil showings in Mississippi lime, topped at 4,430 ft. (—1,729 ft.). Drilled to 4,590 ft., it now has casing run to 4,505 ft. for production tests of a zone at 4,441-52 ft., where a 60-minute drill-stem test recovered 60 ft. of clean oil and 100 ft. of oil-cut mud.

Location of the discovery is about 4 miles south of the town of Gove, and about 3½ miles northeast of the Coberly pool, the county's first production, opened a year ago by Cities Service Oil Co. The latter pool produces from Marmaton lime (Pennsylvanian).

The new pools also are in prospect in the southern part of the embayment east of the Hugoton gas field, one in Seward County and the other in Clark County, southwestern Kansas. In the former county, Flynn Oil Co. is testing Mississippian potentialities at its 1 Jury, SE SE NW 26-33-31, south of Kismet and 5 miles west of the Novinger field. After acidizing the pay in open hole at 5,856-60 ft., the well swabbed at the rate of 7½ bbl. of oil per hour. On a previous 15-hour swabbing test, it averaged 2 bbl. per hour. Top of the Mississippian was logged at 5,581 ft.

The prospective Clark County discovery is at Sunray Oil Corp. 1 Harper, C SE SE 21-34s-21w, southeast of Ashland, in the southeastern part of the county, where a 30-minute drill-stem test in the Chester zone at 5,461-93 ft. got a gas flow estimated good for 6,000,000 cu. ft. per day. Flow pressure was 775 psi. and bottom-hole pressure 2,060 ft. In the breakdown, however, there was 425 ft. of salt water in the pipe. A 2-hour test of a deeper zone at 5,540-50 ft. got a small amount of free oil with some gas. Hole is being deepened.

Continental Oil Co. has made another oil

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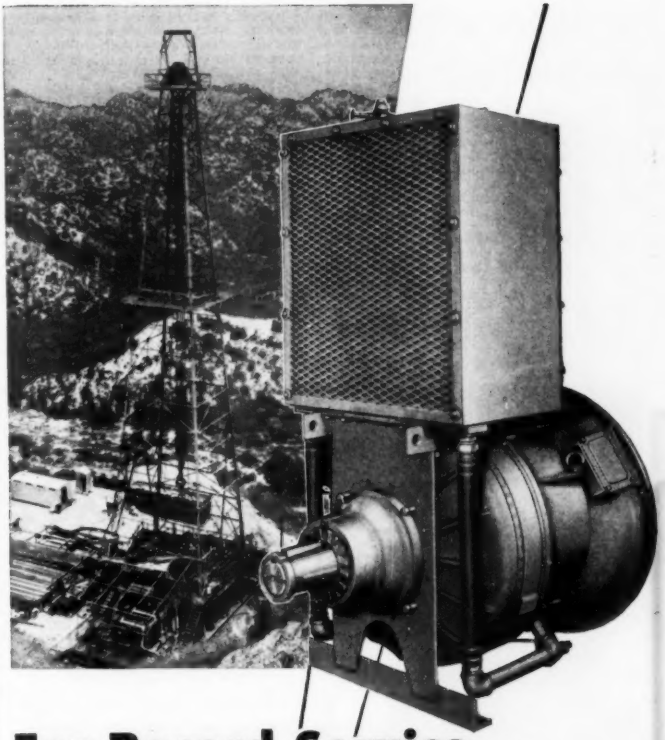

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discovery in Decatur County, on the west flank of the Central Kansas Uplift in the extreme northern part of the state. Its 1-A Feely, SE SE SW 2-5-27, got 1,080 ft. of clean oil in 30 minutes in a drill-stem test at 3,603-30 ft. in the Lansing section, topped at 3,591 ft. A previous 60-minute test higher in the pay at 3,588-3,603 ft. recovered 15 ft. of oil-cut mud. The new discovery is 2 miles north of the company's Hardesty pool, opened earlier this year, and 3 miles southwest of the Jennings pool, opened by The Texas Co. in 1951. The Adell Northwest pool, also opened by Continental Oil Co. earlier this year, is 2 miles south of the Hardesty pool.

Petroleum, Inc., 1 White, NW NW SW 25-10-21, prospective discovery well in the southeast corner of Graham County, produced at the rate of 2 to 3 bbl. of oil per hour during swabbing tests of its Arbuckle pay after acidizing. Total depth is 3,721 ft. with top of the Arbuckle at 3,715 ft. Hope is open below 3,716 ft.

Imperial Petroleum Co. 1-A Prichard, NW NW NE 22-22-14, 3½ miles southwest of Seward, northwestern Stafford County, recovered 900 ft. of free oil with a bottomhole pressure of 1,050 ft. in a 15-minute drill-stem test at 3,588-3,608 ft. in Lansing lime, topped at 3,468 ft. Hole was drilled to the Arbuckle, topped at 3,858 ft., where casing has been run. Location is a mile northwest of the Oscar polo, but is separated from that pool by dry holes.

KANSAS SUCCESSFUL WILDCATS

Rooks County: Murfin Drilling Co. 1 Dancer, NE NE NW 4-8s-17w, pumped 227 bbl. of oil from Lansing-Kansas City 3,142-46 ft., TD 3,387 ft. PBTD 3,180 ft. (opens Dancer pool).

Woodson County: True-Ashlock et al 1 Marion, NW NW NE 5-24s-15e, flowed 35 bbl. oil from Mississippi lime 1,530-42 ft., TD 1,542 ft.

KANSAS WILDCAT FAILURES

Barber County: Prime Drilling Co.—Davis Bros. 1 Clark, NW NW NW 27-33s-10w, dry, TD 5,110 ft.

Barton County: National Cooperative Refining Association 1 Olivierius, SE NE SW 27-16s-15w, dry, TD 3,751 ft.

Duke & Wood 1 Brewer, SW SW SE 14-19s-14w, dry, TD 3,507 ft.

Butler County: Rex & Morris 1 Parry, SW NE NE 21-29s-5e, dry, TD 2,872 ft.

Cheyenne County: Service Drilling Co. 1 Beeson, NE NE NW 8-3s-38w, dry, TD 5,392 ft.

Ellis County: Herndon Drilling Co. 1 Davis "B," SE NE NW 25-11s-20w, dry, TD 3,678 ft.

Gove County: Jones, Shelburne & Farmer 1 Beesley, SW SW SW 13-14s-29w, dry, TD 4,531 ft.

Graham County: H. Gore 1 Gordon, NW NW NW 1-8s-22w, dry, TD 3,800 ft.

Jones, Shelburne & Farmer 1 Noah "E," NE NE SW 16-10s-21w, dry, TD 3,815 ft.

Hodgeman County: W. J. Coppinger 1 Schmitt, NW NW NW 23-22s-25w, dry, TD 5,188 ft.

Marion County: J. P. Gaty 1 Vogel, SE SE NE 9-19s-4e, dry, TD 2,356 ft.

Osage County: L. E. Smith-Cameron 1 Vanderslice, NW NW SW 31-17s-16e, dry, TD 2,171 ft.

Pawnee County: Alpine Oil & Royalty Co. 1 Ingeles, NW NW NE 16-22s-16w, dry, TD 4,060 ft.

Rice County: D. T. Ingling 1 Knottmann, SE SW NW 25-18s-9w, dry, TD 3,382 ft.

Rush County: Northern Pump 1 Holzmeister, NE NE NE 13-16s-17w, dry, TD 3,610 ft.

Russell County: Victor Drilling Co. 1 Foster, NE NE NE 29-14s-15w, dry, TD 3,340 ft.

Stafford County: Simon Lebow 1 Beavers, SW SE SW 34-22s-14w, dry, TD 3,976 ft.

Trego County: M. B. Armer et al 1 Nicholson, SW SW SW 4-15s-21w, dry, TD 4,187 ft.

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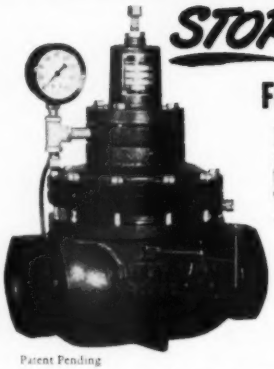

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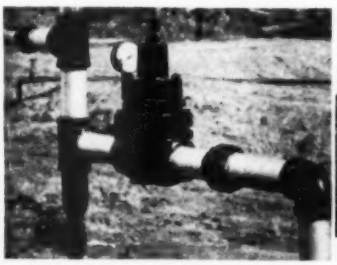

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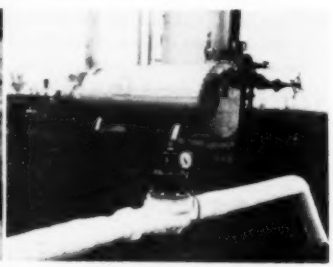

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Rocky Mountain

New Discovery Reported In Powder River Basin

DENVER.—A discovery of importance for the Powder River basin was made by J. Ray McDermott, Denver, in the Ash Creek area, Sheridan County, Wyoming, considerably north of previous oil production on the west side of the basin. The well is 1 Barry, NW NW SW 24-58n-85w, northwest of the town of Sheridan and immediately south of the Montana state line. The well made 2,830 ft. of 36°-gravity oil and 120 ft. of fresh water on 2-hour drill-stem test 4,717-23 ft. Top of the Shannon sand was logged at 4,715 ft.

The wildcat is located on a farmout from Shell Oil Co in the area where Shell last year completed a 10,848-ft. Big Horn formation failure. The Shell well had shows in the Shannon when that zone was drilled. The wildcat is of importance as the first to indicate commercial production this far north in the Powder River basin, one of the largest producing areas in the Rocky Mountains.

There has been an extensive leasing campaign throughout the northern portion of the basin during recent months, with the play extending southward from the Williston basin through southeastern Montana and northward following new discoveries in Pennsylvanian beds at North Fork, Sussex-Meadow Creek, Teapot, and other fields. There is presently an active geophysical campaign through this general area of the Powder River basin, indicating mor exploratory drilling will be scheduled for the general area.

Amerada Petroleum Corp. has recovered Madison oil fom 1 Binhomer Risser, C SW SE 12-149n-96w, wildcat in the Croff area, McKenzie County, North Dakota. This wildcat is the southernmost in the current

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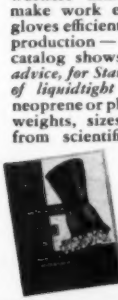

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Amerada wildcat drilling program along the general Nesson anticline through Williams and McKenzie counties, and the well had not indicated too much promise for production from the Madison when that zone was drilled. The well flowed 213 bbl. of 39.5°-gravity oil with some water and gas from the Madison between 9,515-80 ft. following a 1,000 gal. acid treatment. Testing is continuing. This well flowed 11 bbl. of oil per hour from the Devonian between 11,600-30 ft. following acid treatment in that zone. The wildcat is of considerable importance, moving further southward the probable producing areas in the current North Dakota wildcat campaign. Amerada also recovered oil from Madison at 1 Bakken, C SW NW 12-157n-95w, 12 miles north of the Beaver Lodge discovery well, after plugging the well back from Devonian-Ordovician zones. The 1 Bakken was the first well to find Madison oil in the drilling program through this general region, and previously flowed oil from that formation prior to drilling on down to the 13,709 ft. total depth.

On the northeastern Montana side of the Williston basin Shell Oil Co. is preparing to complete 34-26-G, NW SW SE 26-15n-54e, northeast offset to The Texas Co.'s Cedar Creek discovery well. The Shell well was drilled to 9,202 ft., total depth, and had Devonian at 8,553 ft. Casing is cemented at total depth. This well made 7,876 ft. of 39°-gravity oil and 1,000 ft. of oil and gas-cut mud on 90-minute drill-stem test of the zone 9,115-46 ft. and has recovered additional oil on tests of other zones of the Devonian. It is apparently one of the largest producers for the Williston basin. The Texas Co. recovered slightly oil-cut mud on tests, probably in Madison, at 2 NP "G" NCT 1, a wildcat further north along the Cedar Creek axis. Texaco is coring ahead.

COLORADO WILDCAT FAILURE

Logan County: E. M. Stringer 1 Gole, NE NE NE 14-9n-53w, dry, TD 5,935 ft.

UTAH WILDCAT FAILURE

Garfield County, Johns Valley: The California Co. 1 Unit, NE NW SE 22-35s-2w, dry, TD 10,335 ft. Red Wall (Miss.) 10,189 ft.

WESTERN NEBRASKA WILDCAT FAILURES

Cheyenne County: Wytex 1 Herboldsheimer, SE SE NW 3-14n-52w, dry, TD 5,487 ft. "D" sand 5,060 ft., "G" sand 5,092 ft., "J" sand 5,195 ft., Lakota 5,461 ft.

Morrill County: Buehler & Knox 1 Peters, SW NW NW 30-20n-51w, dry, TD 4,743 ft. "D" sand 4,087 ft., "J" sand 4,245 ft., "M" sand 4,450 ft.

SOUTH DAKOTA WILDCAT FAILURES

Corson County: Shell Oil Co. 1 J. K. Winter, C NW SW 11-22n-19e, dry, TD 9,010 ft. Devonian 6,461 ft., Silurian 6,752 ft., Ordovician 7,085 ft., Green shale 7,810 ft., pre-Cambrian 8,433 ft.

Fall River County: T. M. York & Paul Newell 1 Landers, NE SW SE 3-10s-5e, dry, TD 800 ft.

Haakon County: S. E. Pohle Enterprises, Inc., 1 State, SW SW NE 16-4n-18e, dry, TD 4,743 ft.

WYOMING SUCCESSFUL WILDCAT

Big Horn County, Five Mile area: Husky Oil Co. and Wilshire Oil Co. 1 Torgeson, C NE NE 29-49n-93w, est. open flow 40-50,000 M.c.f. of gas per day from Phosphoria, TD 12,283 ft. PBTD 11,740 ft. Alcova 10,935 ft., Dinwoody 11,602 ft., Embar 11,645 ft., Tensleep 11,915 ft., Amsden 12,052 ft., Madison 12,223 ft.

WYOMING WILDCAT FAILURES

Goshen County: Skiles Oil Co. et al 1 Warner, SW SW NW 3-23n-61w, dry, TD 7,164 ft. Muddy 6,832 ft., Skull Creek 6,948 ft., Cloverly 7,091 ft., Morrison 7,152 ft.

Continental Oil Co. 1 Davis, SW NW SW 35-27n-63w, dry, TD 5,510 ft. Basal Sundance 5,450 ft., Spearfish 5,505 ft.

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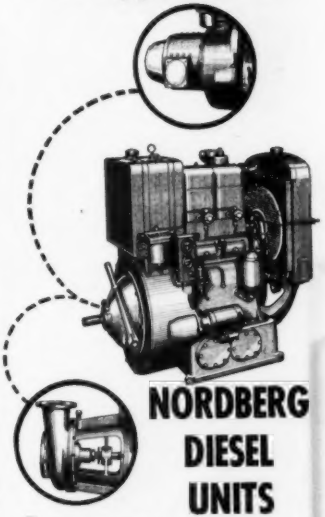

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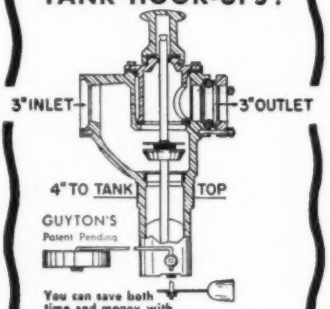

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Central Area

ILLINOIS

Production of the Albion Consolidated pool in Edwards County is being extended more than ¾ mile to the west in the area a mile south of the town of Albion, where Noah Petroleum Co. is testing good saturation found in the Aux Vases zone at its 1 Harry Smith, NW NE NW 13-2s-10e.

Saturation was logged at 3,065-77 ft. with bottom of the hole still in the pay. So far, productivity has not been determined, but in a drill-stem test before casing was run, 450 ft. of clean oil and 90 ft. of mud-cut oil was recovered in 60 minutes with bottom-hole pressure of 1,125 psi. There was no evidence of water.

Stanford Oil Co. has run casing to test saturation logged in both the Benoist sand and McClosky lime zones at its 1 Seifert, NE NE NE 35-2s-9e, a wildcat located 4 miles southeast of Golden Gate and a half mile from other production in that area. McClosky saturation is at 3,365-69 ft. and 3,373-78 ft., and Benoist saturation at 3,085-3,101 ft. A drill-stem test, open 3 hours, in the Benoist zone recovered 495 ft. of clean oil and 180 ft. of oil-cut mud without water. Bottom-hole pressure was 1,008 psi. Rotary hole was carried to 3,382 ft. and casing cemented on the McClosky.

INDIANA

The recently opened Glezen pool, 4 miles southwest of Petersburg, in Pike County, is being extended a quarter mile north where Ryan & Sharp are testing the pool's Benoist sand pay zone at 1,348-52 ft. The hole fills with oil faster than it can be bailed down. The pool was opened in February and now has seven active operations.

C. E. O'Neal and O. B. Trotter have an indicated Aux Vases producer at their 1 Woods, SE NW SW 9-3s-11w, 2 miles east of Owensville, and a half mile from production of the Owensville East pool, in Gibson County. The pay was logged at 2,371-76 ft., and in a drill-stem test flowed clean oil. Tester was open 40 minutes with gas showing in 30 minutes, and oil a short time later.

WESTERN KENTUCKY

J. C. Miller Oil Co. and Ashland Oil & Refining Co. are opening a new producing area 4 miles northeast of Beech Grove, in southwestern Daviess County, near the McLean County line, where their 1 Argyle Faith, in 20-O-26, swabbed at the rate of 6 bbl. of oil per hour in preliminary tests before being shot. Pay is at 2,015-29 ft. in Cypress sand. Since then, the pay has been shot with 60 qt., and, at latest report, was being cleaned out to resume testing. Hole was drilled to 2,118 ft. in Aux Vases sand, found unproductive, and then plugged back to the Cypress, on top of which casing was cemented. The location is more than a mile from any other production in the area.

The Green Briar pool, Henderson County, is being extended a half mile where Tuley & Carter and Iglehart Drilling Co. found good saturation in Hardinsburg sand, logged at 1,996-2,005 ft. Pay section was topped at 1,994 ft. and bottom of the hole at 2,005 ft. still is in saturation. During a 2-hour drill-stem test of the pay sand, the well got a good showing of gas and filled 225 ft. with oil. Bottom-hole pressure was 550 psi. Casing has been run to 1,994 ft.

EASTERN KENTUCKY

In the Johns Creek Pool of northeastern Floyd County, A. V. Hoenig and Ashland Oil & Refining Co. topped Mississippian lime at 1,590 ft. at their attempted eastern extension to the pool and had a fillup of 450 ft. of oil in 22 hrs. at a total depth of 1,697 ft. Operators have acidized with 2,000 gal. and are currently testing.

MICHIGAN

What may prove to be a commercial Traverse oil pay was logged in Mineral Springs field, Sherman Township, Osceola County, at Walter E. Anders 2 Kidder, SW SE NE 20-20n-9w, but well will not be

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completed in this horizon—at least not until the Dundee is drilled and tested. Traverse lime was logged at 3,224 ft., and Alpena Traverse was picked at 3,256 ft. Well bailed 19 bbl. of 41-3°-gravity crude oil a day from this Traverse pay. Hole was being drilled on towards the Dundee and water was logged at 3,266 ft. The Mineral Springs pool is at present producing oil from the Dundee and gas from the Michigan Stray sand. Anderson discovered the gas horizon on this same lease and at the same approximate location. Rig was skidded from the gas discovery location a few feet to drill this new well. If further drilling in the area should uncover another Traverse well, or more, Mineral Springs may go into the record books as being a three-horizon producing field.

ILLINOIS WILDCAT FAILURES

Alexander County: Crindle & Dick 1 Petty, NE SW SE 19-16s2w, dry, TD 1,058 ft.

Christian County: Kamco Oil Co. 1 Hackenburg, SE SE SE 13-13n-1w, dry, TD 2,381 ft.

Clark County: J. R. Shake 1 Southard, C E½ SE SE 23-11n-14w, dry, TD 910 ft.

Continental Oil Co. 1 Drummond, NE NW SE 11-9n-13w, dry, TD 1,572 ft.

Clay County: Aurora Gasoline Co. 1 Valbert, SW NW SE 11-2n-6e, dry, TD 3,166 ft.

Ashland Oil & Refining Co. and A. G. Beeker 1 Hoard, NE NE NE 34-3n-7e, dry, TD 3,070 ft.

Douglas County: National Petroleum Chemical Co. 5-2 Petra, SE SW SE 13-16n-8e, dry, TD 800 ft.

Jasper County: Aurora Gasoline Co. 1 Weiscope, SW SE SE 7-5n-11e, dry, TD 3,001 ft.

Lawrence County: Olds Oil Co. 1 Wegner, 330 ft. from SL and WL N½ SW Fractional Section 19-4n-11w, dry, TD 1,940 ft.

Montgomery County: J. W. Harmon 1 Hjort, NW SW SE 18-10n-4w, dry, TD 610 ft.

Randolph County: Peak Drilling Co. 1 Bertha Boynton, NW NW SE 21-5s-6w, dry, 2,010 ft.

Sam Tipps 1 Palmer, SW SE SW 10-4s-5w, dry, TD 2,338 ft.

George Schoonmaker 1 Gelonek, C N½ NW SW 21-4s-5w, dry, TD 2,338 ft.

Washington County: C. R. Winn 1 Bendrick, SW NE SW 27-3s-1w, dry, TD 1,614 ft.

White County: Stanford Oil Co. 1 Williams, NW NW NE 4-4s-9e, dry, TD 3,529 ft.

Stanford Oil Co. 1 Ragsdale, NE SE NW 4-7s-8e, dry, TD 3,147 ft.

ILLINOIS SUCCESSFUL WILDCATS

Clay County: Superior Oil Co. 1 Lusk, SW SW SE 7-2n-7e, IP 20 bbl., Rosiclare 3,119-25 ft., TD 3,208 ft. (extension Stanford South pool.)

Jasper County: Calvert Drilling, Inc., 1 Eberhardt, SE NE NE 21-5n-10e, IP 193 bbl., McClosky 2,884-97 ft. ad 2,902-10 ft., TD 2,955 ft. (extension Clay City Consolidated pool.)

INDIANA WILDCAT FAILURES

Sullivan County: E. Nash 1 McCracken, NW SW NE 5-8n-9e, dry, TD 2,388 ft.

Vanderburgh County: Johnston Drilling Co. 1 Scherer, NW NE NE 28-4s-10w, dry, TD 2,312 ft.

Vigo County: F. B. Cline 1 Heramb, NE NE NW 22-10n-10w, dry, TD 1,460 ft.

WESTERN KENTUCKY WILDCAT FAILURES

Daviess County: Stanford Oil Co. 1 Kirtley-Yeiser, NWc NW NW SE 14-N-30, dry, TD 1,471 ft.

Hopkins County: White & Vickery 1 Taylor, NEc SE NE NE 11-I-21, dry, TD 622 ft.

Webster County: W. F. Lacy 1 Melton, W½ NE SE SW 18-N-23, dry, TD 2,744 ft.

MICHIGAN WILDCAT FAILURES

Allegan County, Wayland Township: Del Fortney 1 Hazen, NW NE NW 31-3n-11w, Traverse 1,800 ft., dry, TD 1,805 ft.

Isabella County, Isabella Township: John Neyer 1 Stouse, NE NW SW 31-15n-4w, Dundee 3,738 ft., dry, TD 4,602 ft.

Midland County, Geneva Township: Granville C. Berlin 1 Clark et al NE SE NE 4-15n-2w, Dundee 3,672 ft., dry, TD 3,850 ft.

Montcalm County, Home Township: McClure Oil Co. A-1 Rolston, SE SE SW 24-12n-6w, Dundee 3,423 ft., dry, TD 3,431 ft.

Muskegon County, Casnovia Township: P. K. Degenther 1 Herman, SW SW SW 19-10n-13w, Dundee 2,426 ft., dry, TD 2,538 ft.

Tuscola County, Novesta Township: Alvin Weber & Muskegon Development Co. 1 Stickler & Shell Oil Co., NW SW NE 10-13n-11e, Dundee 2,520 ft., dry, TD 2,717 ft.

Van Buren County, Geneva Township: Norman L. Stevens 1 Tolles et al SE SW SE 15-1s-16w, Traverse 1,089 ft., dry, TD 1,104 ft.

Rocky Mountain Maps

Sectionized production maps showing oil fields in green, gas fields in red with official field names. Sections, townships, ranges and county seats. Drilling wells and dry holes with total depths.

Williston Basin — Size, 42" x 48". Scale, 1" = 10 miles. Prices: Paper, $30.00; Linen, $37.50.

Denver-Julesburg Basin — Size, 30" x 38". Scale, 1" = 8 miles. Prices: Paper, $20.00; Linen, $25.00.

North Dakota — Size, 52" x 74". Scale, 1" = 5 miles. Prices: Paper, $30.00; Linen, $37.50.

East Montana — Size, 54" x 54". Scale, 1" = 5½ miles. Prices: Paper, $28.00; Linen, $35.00.

South Dakota, Nebraska, West Montana, Wyoming, Colorado, Utah, Kansas and Oklahoma. Folder sent on request.

E. C. Jacobson

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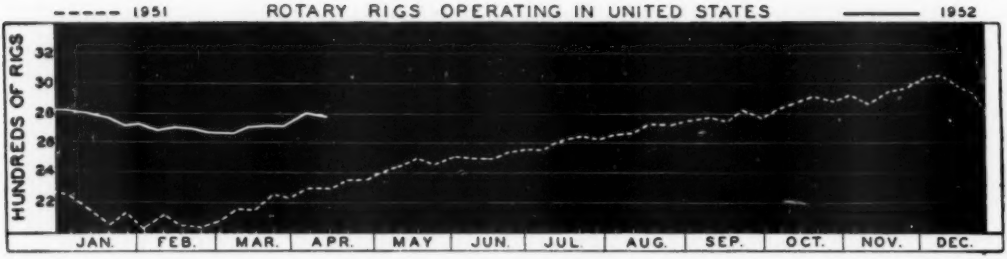
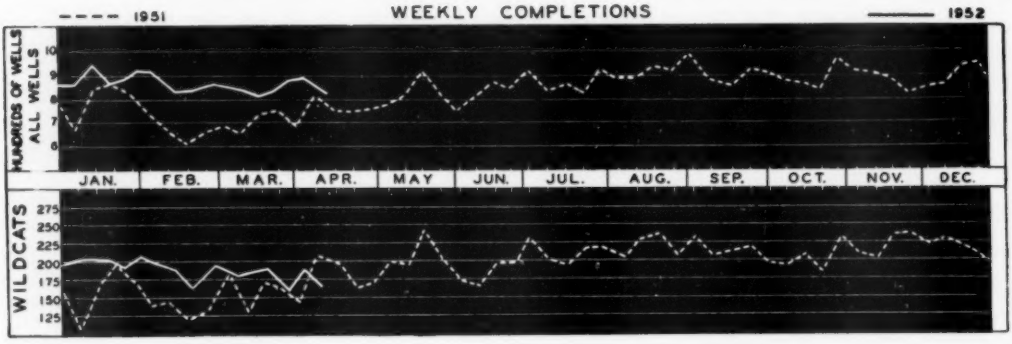
	Odessa, Texas 6-6774	Casper, Wyo. 3739
	Abilene, Texas 2-2790	Carmi, Ill. 7799
	Victoria, Texas 3264	Ft. Morgan, Colo. 1143
	Norman, Okla. 4360	Great Bend, Kans. ... 7585
Distributors	Diamond Drilling Co., 2759 E. Willow St., Long Beach, Calif., Telephone: Long Beach 40-7949	
	Allied Services, Inc., Mt. Pleasant, Michigan Telephone: 29-861	
Foreign	D. T. O'Connor, 500 Fifth Avenue, New York, N. Y.	
	Petroleum Industry Consultants, C. A., Caracas, Venez.	
	Denton - Spencer Co., Ltd., Calgary, Alberta, Canada.	

THE OIL AND GAS JOURNAL

"Oh, I'm sure I wouldn't be interested in that drilling section—but let's take a look at what you got."





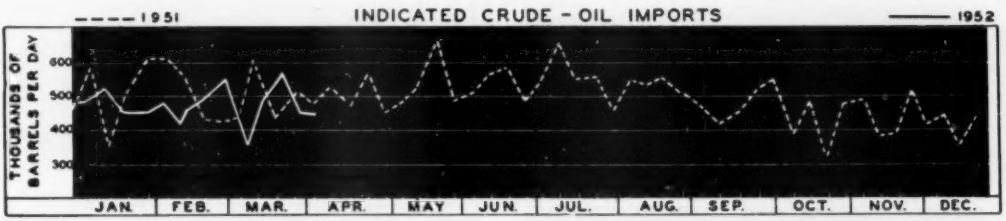
CURRENT STATISTICS

EXPLORATION

WEEKLY WELL COMPLETIONS . . . WEEK ENDED APRIL 12, 1952

	Total of all wells					Apr. 12		Wildcat completions and discoveries									
													Cumulative total, 1952				
	Comp.	Oil	Gas	Dry	Footage	1952	1951	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	12	6	0	*6	16,000	152	54	0	0	2	0	0	0	0	0	0	0
Pennsylvania	31	16	0	†15	65,000	444	229	0	0	0	0	0	0	0	0	2	2
West Virginia	10	0	8	2	29,939	191	168	0	0	0	0	0	0	0	2	1	3
Ohio	18	5	3	‡10	31,095	238	211	0	0	0	0	0	0	0	2	0	2
Indiana	19	7	0	12	35,005	297	258	0	0	0	3	3	11	0	2	95	108
Kentucky	18	3	4	11	29,258	341	212	0	0	0	3	3	8	0	0	61	69
Illinois	40	13	1	§26	89,893	400	425	2	0	0	16	18	7	0	0	100	107
Michigan	15	4	1	10	40,276	181	193	0	0	0	7	7	8	0	1	64	73
Kansas	86	35	8	§43	281,723	1,390	1,137	2	0	0	18	20	30	0	4	219	253
Nebraska	3	0	0	3	15,105	69	86	0	0	0	2	2	2	0	0	38	40
Oklahoma	111	63	2	‡46	425,987	1,773	1,509	1	0	0	11	12	29	1	6	182	218
Texas	307	199	12	96	1,585,864	5,024	4,470	13	1	1	55	70	230	23	32	1,060	1,345
North Central (Dist. 7-B & 9)	89	42	2	45	286,921	1,541	1,336	6	0	1	23	30	129	1	10	450	590
West (Dist. 7-C & 8)	103	93	0	10	651,544	1,558	1,369	5	0	0	7	12	43	0	3	181	227
Panhandle (Dist. 10)	6	5	1	0	18,320	192	195	0	0	0	0	0	1	0	2	17	20
Eastern (Dist. 5 & 6)	14	6	1	§7	84,059	265	327	0	0	0	4	4	10	2	0	62	74
Gulf Coast (Dist. 2 & 3)	58	33	4	21	381,187	761	627	1	1	0	10	12	31	13	8	151	203
Southwest (Dist. 1 & 4)	37	20	4	13	163,833	707	616	1	0	0	11	12	16	7	9	199	231
Louisiana	35	20	2	13	231,051	629	557	1	1	0	3	5	12	6	3	66	87
Northern	18	12	0	6	55,901	341	261	1	0	0	1	2	6	0	3	27	36
Southern	17	8	2	7	175,150	288	296	0	1	0	2	3	6	6	0	39	51
Arkansas	9	5	0	4	30,301	105	106	0	0	0	1	1	4	0	0	14	18
Mississippi	5	3	0	2	37,948	114	67	0	0	0	1	1	5	1	1	42	49
Southeastern States	1	0	0	1	5,145	15	15	0	0	0	1	1	1	0	1	9	11
Montana	2	2	0	0	4,811	53	56	0	0	0	0	0	2	0	0	14	16
Wyoming	11	6	1	4	54,576	185	189	0	0	1	2	3	10	0	2	20	32
Colorado-Utah	7	2	1	4	42,276	146	66	0	0	0	2	2	7	0	4	46	57
New Mexico	21	16	5	0	130,499	273	185	0	0	0	2	2	9	0	1	21	31
California	58	41	1	16	237,649	733	555	1	0	0	13	14	31	0	0	133	164
North Dakota	0	0	0	0	0	5	2	0	0	0	0	0	1	0	0	2	3
Miscellaneous (S. D.)	3	0	0	3	14,553	18	10	0	0	0	3	3	0	0	5	7	12
Total United States	822	446	49	327	3,433,954	12,776	10,760	20	2	2	143	167	407	31	66	2,206	2,710
Total previous week	891	492	55	344	3,719,492			33	3	3	149	188	387	29	64	2,063	2,543
Total April 14, 1951	761	385	46	330	2,981,337			31	0	4	164	199	377	22	74	1,892	2,365

Service wells included: *6, †12, ‡2, §1.

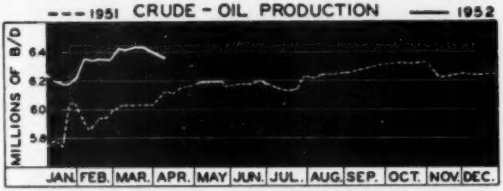


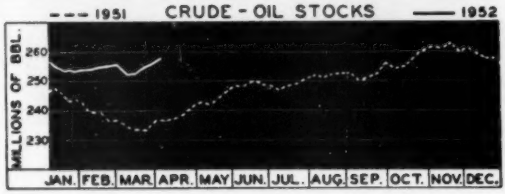
DAILY AVERAGE PRODUCTION FOR WEEK

	April 12, 1952 Crude oil	Lease condensate	Total	April 5 total
Alabama	2,700		2,700	2,700
Arkansas	76,350	4,850	81,200	81,100
California	979,600		979,600	978,900
Colorado	83,500		83,500	84,600
Eastern	58,800		58,800	58,600
Florida	1,775		1,775	1,525
Illinois	167,200		167,200	169,300
Indiana	29,300		29,300	28,900
Kansas	320,500		320,500	329,200
Kentucky	35,600		35,600	35,800
Louisiana	622,950	39,200	662,150	662,350
North	112,450	14,200	126,650	126,250
South	510,500	25,000	535,500	536,100
Michigan	37,200		37,200	35,700
Mississippi	93,925	4,575	98,500	98,675
Montana	24,400		24,400	24,200
Nebraska	6,400		6,400	5,800
New Mexico	162,525	450	162,975	162,850
Oklahoma	528,600		528,600	524,300
Texas	2,842,850	45,325	2,888,175	2,907,365
Dist. 1	33,750	200	33,950	33,875
Dist. 2	161,075	3,825	164,900	166,475
Dist. 3	467,550	25,500	493,050	494,800
Dist. 4	261,250	4,500	265,750	267,900
Dist. 5	60,900	400	61,300	61,725
Dist. 6	121,375	4,425	125,800	127,375
E. Texas field	272,700		272,700	270,500
Dist. 7-B	89,500	100	89,600	89,215
Dist. 7-C	132,150	5,650	137,800	140,200
Dist. 8	998,425	275	998,700	1,010,925
Dist. 9	161,175	450	161,625	161,625
Dist. 10	83,000		83,000	82,750
Utah	3,900		3,900	4,100
Wyoming	192,000		192,000	191,000
Total U. S.	6,270,075	94,400	6,364,475	6,386,965
Change from previous week.			down 22,490	
Canada	98,980		98,980	98,980

Total U. S. production January 1-April 12 ..... 652,066,475 bbl.
Same period last year (crude plus cond.) ..... *616,532,800 bbl.

*Including 8,349,000 bbl. condensate.

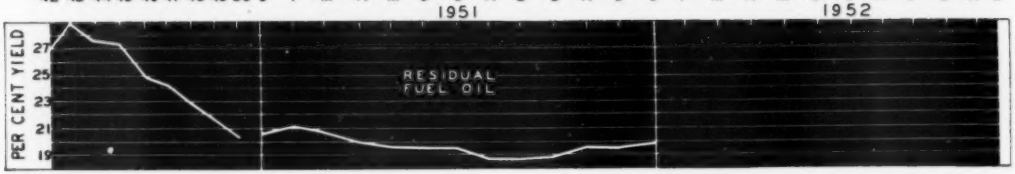


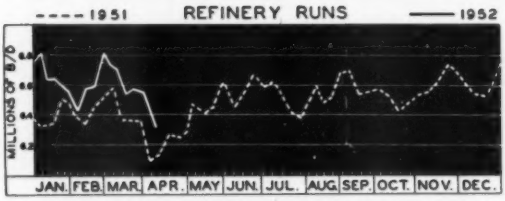


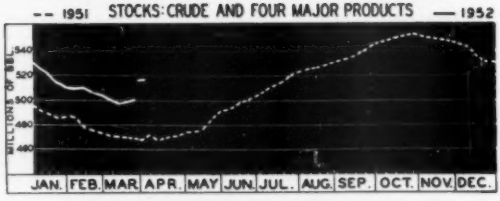
CRUDE-OIL STOCKS BY STATES OF ORIGIN*
(Thousands of barrels)

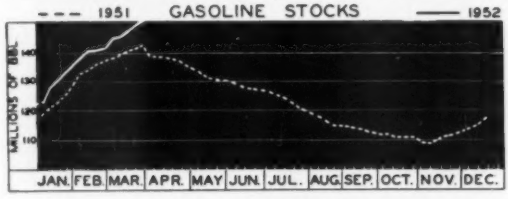
	Apr. 5, 1952	Mar. 29, 1952	Apr. 7, 1951
Pennsylvania Grade	2,399	2,274	2,059
Other Appalachian	2,113	2,057	1,408
Illinois, Indiana, Michigan	11,162	11,556	9,275
Arkansas	3,095	3,057	2,817
Louisiana	14,862	14,442	14,382
North	3,054	3,083	3,034
Gulf	11,808	11,359	11,348
Mississippi	3,465	3,506	2,996
New Mexico	7,492	7,534	7,063
Oklahoma and Kansas	39,328	38,035	37,473
Texas	123,738	123,726	106,128
East Texas proper	11,363	11,413	(†)
West Texas	54,924	55,191	(†)
Texas Gulf	25,493	26,062	(†)
Other Texas	31,958	31,060	(†)
Rocky Mountain	14,792	14,275	13,087
California	30,308	30,194	30,437
Foreign	5,696	6,005	6,471
Total	258,450	256,661	235,598

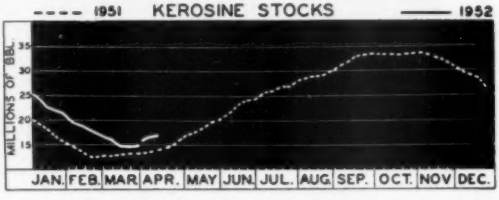
*Bureau of Mines. †Not comparable with current week.

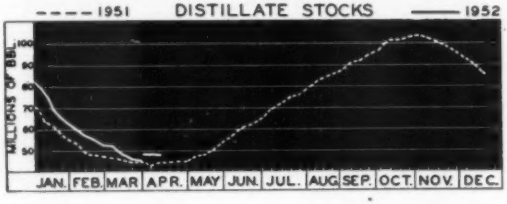


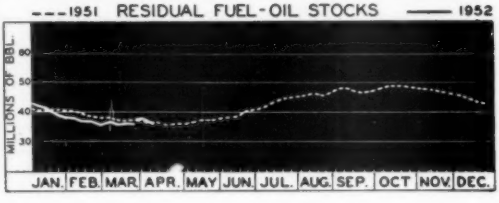










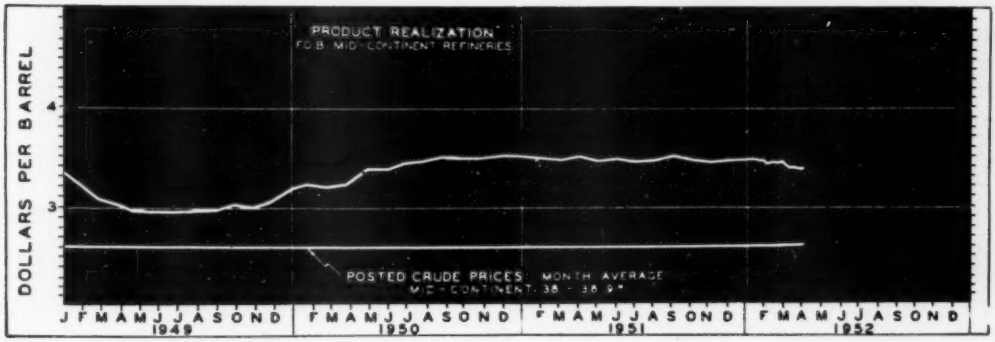


A.P.I. REFINERY REPORT, APRIL 12

(Thousands of barrels)

District—	Daily avg. crude runs	Daily average production				Stocks at refineries, bulk terminals, in transit and in pipe lines				Bureau of Mines, April 1951				
		Gasoline*	Kerosine	Distillate	Residual	Gasoline†	Kerosine	Distillate	Residual	Daily avg. crude runs	Daily average production			
											Gasoline*	Kerosine	Distillate	Residual
East Coast	856	379.2	49.1	170.0	224.7	31,375	7,303	14,751	9,572	962	360.2	47.5	208.2	211.5
Appalachian:														
District 1	88	36.1	5.9	13.1	13.3	3,992	359	604	428	105	46.2	6.8	14.2	11.4
District 2	60	32.0	5.1	13.1	11.7	1,943	167	355	214	76	36.6	4.8	12.1	15.2
Ind., Ill., Ky.	1,217	627.4	70.7	208.6	166.9	37,063	2,951	7,916	4,708	1,117	580.2	75.6	186.0	175.3
Okla., Kans., Mo.	501	278.3	18.0	103.7	58.9	18,361	1,002	7,192	1,284	494	262.2	18.6	107.6	62.3
Inland Texas	237	168.1	13.6	33.4	37.7	6,644	390	1,064	702	238	142.8	14.9	37.4	45.4
Texas Gulf Coast	1,659	768.2	145.6	432.6	264.1	24,944	2,549	6,546	6,032	1,484	648.3	130.2	300.3	243.8
La. Gulf Coast	521	260.3	65.3	137.9	50.1	7,966	1,258	2,275	1,783	481	218.2	64.0	104.7	53.9
N. La. and Ark.	79	32.4	8.1	21.9	5.4	3,095	523	852	129	84	32.1	8.4	14.6	8.3
Rocky Mountain:														
New Mexico	17	10.3		1.9	3.9	159		55	36	15	8.2	0.3	2.7	3.6
Other Rocky Mtn.	157	89.7	1.9	37.4	38.1	6,130	242	1,223	927	185	92.0	2.3	38.2	42.9
California	923	395.4	5.3	171.0	374.6	16,109	273	5,661	10,065	942	394.0	10.3	145.3	356.7
April 12, 1952	6,315	3,077.4	388.6	1,344.6	1,249.4	157,781	17,017	48,494	35,880	6,183	2,821.0	383.7	1,171.3	1,230.3
April 5, 1952	6,557	3,058.6	371.1	1,347.7	1,266.4	158,304	16,533	48,751	36,905					
April 14, 1951	6,127	2,767.3	384.4	1,213.1	1,262.0	147,734	15,799	47,048	37,691					

*At refineries including natural blended. †Finished and unfinished.


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
DOLLARS PER BARREL
4
3
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT, 38 - 38.9°
J F M A M J J A S O N D
1949
F M A M J J A S O N D
1950
F M A M J J A S O N D
1951
F M A M J J A S O N D
1952

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil. Realization averaged $3.36 for week ended April 5, $3.36 for previous week, and $3.51 for April 1951. The above trend information is based on volumes and current prices and therefore does not reflect changes in operating costs.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of April 16, 1952. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10-10¼	12-12.75	10¾-11
Premium gasoline, 86-88 octane	11-11⅜	13.5-13.75	11¾-12
43-44 w.w. kerosine	8¾-9	10-10.1	9
No. 2 straw fuel oil	7¾-8	9-9.25	8
No. 6 residual	$1.35-1.45	$2.45-2.60	$1.75-1.90

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5½	5	5¼
Grade 18-55	6.6	6.1	6.35

LUBRICATING OILS

South Texas

300 vis., No. 2-3 neutral	13-13.5
750 vis., No. 3-4 neutral	16
2,000 No. 5-6 neutral	18-19

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	29
200 vis., No. 3 neutral, 0-10 pp.	16.5

Western Pennsylvania

145-155 vis., 10 p.t. bright stock	32.5
180 vis., 0 p.t., neutral	31.5

WAX

Mid-Continent

132-134 A.M.P.	5.5

SPOT tanker rates continued a rapid decline in the week ended April 12 with seven fixtures reported during the week at Maritime Commission base plus 50 per cent. All but one were dirty vessels.

Decreases in the latest reported week bring total reductions in the past 4 weeks to 150 points. Spot rates during the winter months were at the ceiling of MC plus 200 per cent.

High tanker rates and the probability of higher ceilings on the East Coast before June 1 have held product movement in the New York Harbor area to sales against contracts or to regular customers.

Reports of shipments on the New York barge canal for the first week of the season indicate that barge movement for the next few weeks will be limited by the lack of material for open trading in New York Harbor.

Under the lower spot tanker rates, Gulf-East Coast movement will increase which will tend to equalize stocks in the areas. On April 7, District 3 stocks were 15 per cent greater than last year compared with an addition of only 6.9 per cent for District 1.

Tanker rates dropped to MC minus 10 per cent for a short period in June last year. The general thinking for this year is that rates will hold at about the current level until Gulf Coast and East Coast stocks reach a normal balance, and further decreases may follow by early summer.

The general tone of gasoline markets in the Mid-Continent and North Central areas has improved slightly within the past week. Prices remain about the same with some gasoline still available at pipe-line terminals at about the low of Group 3 plus .25 cent.

Marketers in District 2 are predicting some gain in tank-car movement of products in the last half of April since the increase in freight rates are effective May 2. Any planned movement for early May will be moved up to late April.

Kerosine and distillate fuels on the Group 3 market are being quoted at last week's prices with very little material moving. Most refiners will begin storing burning oils earlier this year.

CRUDE PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.‡	Okla-homa, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.93	....	....	
19-19.9	1.98	....	....	
20-20.9	2.03	$2.25	....	$2.12
21-21.9	2.07	2.27	....	2.14
22-22.9	2.12	2.29	....	2.16
23-23.9	2.18	2.31	....	2.18
24-24.9	2.24	2.33	$2.56	2.20
25-25.9	2.30	2.35	2.58	2.22
26-26.9	2.36	2.37	2.60	2.24
27-27.9	2.41	2.39	2.62	2.26
28-28.9	2.46	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.57	2.45	2.68	2.32
31-31.9	2.62	2.47	2.70	2.34
32-32.9	2.68	2.49	2.72	2.36
33-33.9	....	2.51	2.74	2.38
34-34.9	....	2.53	2.76	2.40
35-35.9	....	2.55	2.78	2.42
36-36.9	....	2.57	2.80	2.44
37-37.9	....	2.59	2.82	2.46
38-38.9	....	2.61	2.84	2.48
39-39.9	....	2.63	2.86	2.50
40 and above	....	2.65	2.88	2.53

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947.

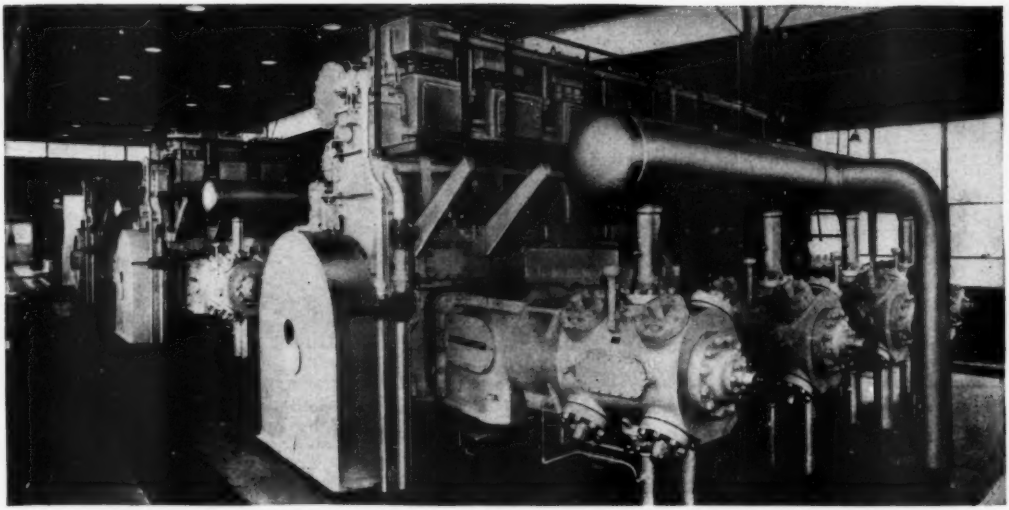
‡Standard Oil Co. of California.

FLAT CRUDE PRICES

Representative posted schedules per barrel

Kettleman Hills, California*	$2.80
Louisiana:	
Beauregard Parish	2.60
Cotton Valley (distillate)	2.85
Cotton Valley (crude)	2.70
Texas:	
East Texas	2.85
Pecos County (Yates)	2.38
Conroe	2.83
Van	2.48
Pennsylvania Grade:	
Bradford	4.25
Southwest Pennsylvania	3.82
West Virginia	3.78
Illinois Basin	2.77

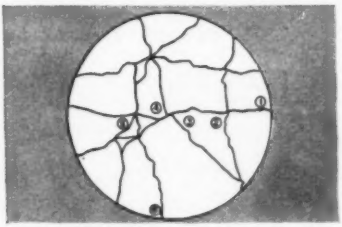
*37°-37.9°



WORTHINGTON UTC-16's "on the line" at the Buckley compressor station of Arkansas Louisiana Gas Co., Blanchard, La.

The Worthington count in the Shreveport area—

35 pipeline compressors to produce 53,000 bhp for five companies



COMPRESSOR STATIONS in operation or on order using Worthington UTC-16 Engine Compressors.

Five leading gas-transmission companies have installed or have on order to be installed in the immediate Shreveport area alone a total of 35 Worthington UTC-16 Engine-Compressor units with a combined output of 53,000 bhp.

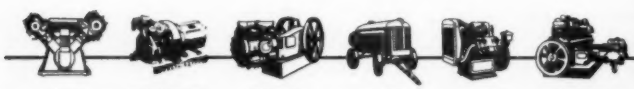
What makes this Worthington Uniflo Angle Gas Engine Compressor so popular? Take a look at the features and draw your own conclusions:

complete removal of exhaust gas . . . more thorough charging with gas and air . . . positive timing for optimum combustion . . . effective supercharging . . . carbonization prevented by low operating temperatures . . . harmful cylinder stresses eliminated as uniform temperature results in equal cylinder wall stresses.

Take advantage of this great improvement in Engine Compressors for gas transmission. For more facts, write to Worthington Pump and Machinery Corporation, Engine Division, Buffalo, New York.

No.	Station	Total hp	Customer
1	Station 6, West Monroe, La.	12,800	Tennessee Gas Trans. Co.
2	Bienville Station	4,800	Southern Natural Gas Co.
3	Keran Station	4,000	United Gas Pipeline Co.
4	Buckley Station	7,800	Arkansas-Louisiana Gas Co.
5	Marshall Station	10,000	Texas-Illinois Natural Gas Pipeline Co.
6	Station 4, Jasper	14,400	Tennessee Gas Trans. Co.

EK.1.3



NO OTHER COMPRESSOR WILL OUTPERFORM A WORTHINGTON

WORTHINGTON

Engine Compressors

EQUIPMENT MEN . . . in the News

Tucker Assigned to Totco West Texas Division

A. D. TUCKER

H. H. (Pete) Peters, vice president of Technical Oil Tool Corp., Los Angeles, has announced the appointment of A. D. (Doyle) Tucker to the staff of the West Texas division. Tucker will service Totco customers in the Snyder and San Angelo, Tex., area, making his headquarters in Snyder. Working directly under F. E. Siever, West Texas division manager, Tucker will handle the territory covered by the Continental Supply Co. stores in Snyder and San Angelo.

Cameron Opens Warehouse Headquarters at Harvey

Cameron Iron Works has announced the opening of a new warehouse and district headquarters office at Harvey, La. D. V. Clemons is district manager of the Louisiana, Mississippi, Gulf Coast division. B. B. Biggs has been appointed warehouseman.

Other Cameron representatives in the Louisiana, Mississippi, Gulf Coast district include Fox Moses at Sulphur, La.; Cal Grevemberg at Lake Charles, La.; H. L. Evans and B. B. Bryan at New Iberia, La.; George Myers at Baton Rouge, La.; and W. C. Traweek at Houma, La.

Southwestern Consultants Moves Central Office

DR. HARRIS

Southwestern Consultants, Inc., a contract seismograph firm with six crews and more than 100 employes, has moved its central office from Tulsa to Fort Worth, as announced by Dr. Sidon Harris, recently named president of the company.

Dr. Harris also heads Southern Geophysical Co., of Fort Worth. The two companies operate 28 seismograph field parties located from Utah to Florida and from Montana to the Gulf Coast.

Southwestern Consultants share division offices in Midland and Denver with Southern Geophysical Co.

G. C. Shivers, Jr., is executive vice president of Southwestern Consultants and is stationed in the Rocky Mountain division offices in Denver. R. E. Gathings is vice president and Carl Hoera, secretary-treasurer.

Directors of Southwestern Consultants are Dr. Harris, chairman of the board; Lionel W. Bevan, Sr., prominent Fort Worth business man; Elmer F. Blake, Gathings and Shivers.

Rector Announces Three Organizational Changes

J. L. CURRY

L. C. Rector, president, Rector Well Equipment Co., Inc., Fort Worth, has announced the promotion of John L. Curry from manager of the company's Alice, Tex., district to manager of the Fulbore Cementing equipment department with headquarters at Fort Worth.

G. M. ROBINSON

J. P. SCOTT

Curry has been engaged in oil-industry sales and engineering work for the past 15 years, during which time he has had 10 years' oil-well-cementing experience, as well as 2 years in drilling and production work.

Rector also announces two sales appointments to its West Texas division, which is under the management of W. P. Knight, with headquarters at Midland, Tex.

G. M. Robinson will have headquarters at Abilene, Tex. He formerly worked for Atlantic Refining Co., G & W Well Servicing Co., and Sacra Brothers Co. before joining Rector.

John P. Scott will be stationed at Hobbs, N. M. He is a graduate of Henderson State Teachers College, Arkadelphia, Ark. Scott was with Mid-Continent Supply Co. prior to joining Rector's sales organization.

Sprague Is Named Executive Vice President of Hays Corp.

PHIL SPRAGUE

P. B. LEBOEUF

Phil Sprague, Jr., has been appointed executive vice president of The Hays Corp., Michigan City, Ind., manufacturer of combustion instruments and controls. Sprague, a Beloit College and Harvard Business School graduate, has been advertising manager of the company for the past several years.

Hays at the same time announced the appointment of Paul B. LeBoeuf to succeed Sprague as advertising manager. LeBoeuf cames to Hays from A. O. Smith Corp., Water Heater Division, Kankakee, Ill., where he was in charge of advertising and sales promotion.

Uthoff Made Regional Sales Engineer of Wedgeplug

C. J. UTHOFF

John Y. Snyder, president and general manager of Wedgeplug Valve Co., Inc., has announced the appointment of Charles J. Uthoff as regional sales engineer for the Southwestern district.

Uthoff, a graduate engineer of Tulane, and who received his M. S. degree in the same field from Louisiana State University, is an experienced sales engineer. As special factory representative, Uthoff will work closely with Alfred Kent Co., Houston, and Harris Pruitt, Fort Worth, who are Wedgeplug sales representatives in this area.

Harrisburg Steel Corp. Elects Two New Directors

According to a recent announcement by J. T. Simpson, president of Harrisburg Steel Corp., H. M.

(Continued on page 234)

CLASSIFIED ADVERTISING

Your MARKET PLACE FOR THE OIL AND GAS INDUSTRY...

UNDISPLAYED CLASSIFIED 15c a word one issue. 10% Discount three or more consecutive issues. $3.00 minimum charge. Blind Box in our care nine words. Payable in Advance.

DISPLAY CLASSIFIED
$12.00 a column inch one issue . . .
10% Discount three or more issues.

Address Classified Advertising Material: The Oil and Gas Journal, P. O. Box 1260, Tulsa 1, Okla.

EQUIPMENT FOR SALE

BUCYRUS 36L completely overhauled, A1 condition, steel dog house, Kolher, Big Hole tools or may be sold with 5" & 6" tools only—Call or write Big State Tool Co., Odessa, Texas. Pho. 7-3052.

FOR SALE: Number of ZC-118 Fairbanks-Morse Engines. In good condition. Taken from Lease recently electrified. At San Angelo, Texas. Lemay Oil Co., 506 Olive St., St. Louis, Mo. Telephone CHestnut 7888.

FOR SALE at W. C. Norris Plant, Tulsa, 1,813 new 5½" OD 8 Round Thread API J-55 National Tube Seamless Steel Casing Couplings, Price $5.00 ea., all or any portion. Cities Service Oil, Patridge, Bartlesville, Oklahoma.

FOR SALE: Wilson Giant Rig complete with 2 250 H.P. Cummings Diesel Engines compound; 96 foot Hi Speed Lee C. Moore Mast; 4000 feet nearly new Drill Pipe; 7¼ x 14 Pump, measuring lines, etc., complete ready to drill. Box E-668, The Oil and Gas Journal, Tulsa, Oklahoma.

ONE 18x7 CLASS ES-1 Ingersoll-Rand Dry Vacuum Pump with K-428 Buda Power Unit complete with V-Belt drive equipment, water tank, scrubber, valves, etc., and mounted on structural steel skids. Operated 60 days. M. F. McCain, Giddens-Lane Building, Shreveport, Louisiana.

EQUIPMENT FOR SALE

FOR SALE: Our Sasakwa Gasoline Plant only, "no field lines" now ready for disposal. Inventory and price available upon request Cities Service Oil Company. Patridge, Bartlesville, Okla.

FOR SALE: Walker-Neer Spudder S-32 Special, complete with tailing-in tools for 5" and 7" casing. Lines extra good. Dog house, light plant, float trailer. Complete tools for drilling, running tubing, sucker rods, etc. Butane equipped. Price $15,000.00. For inventory write Box 1022, Del Rio, Texas.

for
VALVES • FLANGES • FITTINGS
it's
Newman's Inc.
"One of the Southwest's Leading Distributors"
Tulsa, Okla. P.O. Box 1865 Ph. 25228-LD 635

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-58 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 30-25-50 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 133—Rockdale, Texas
AT-3427—Houston, Texas

EQUIPMENT FOR SALE

FOR SALE: Well Drilling Business—71-Star, Modernized #3 Keystone, Both Truck Mounted. Complete Tools, 4 to 20 inch. Physical Inventory $15,000. Nets $8,000 to $8,000 yearly. This is Industrial—No Pipe Worries. Sales Price: $11,000.00. Owner retiring. Write Box E-894, The Oil and Gas Journal, Tulsa, Oklahoma.

26 & 30 Inch New Pipe

CARLOAD & LCL LOTS

26"—⅜" wall (85.733#/Ft.)
30"—⅜" wall (99.083#/Ft.)
30"—⅝" wall (118.649#/Ft.)

Mill run pipe seconds, suitable for road casing, piling, and low pressure piping (100# test).

Double Random Lengths.
Exceptionally Low Priced.
Prompt Shipment from Warehouse.
Subject Prior Sale.

L. B. Foster Co.
1721 Commerce Bldg. Houston 2, Texas
Phone—Blackstone 3281
Chicago New York Pittsburgh

FOR SALE

140,000 of 6⅝" OD, 18.97# wrought iron and steel line pipe

7,500 feet of 8⅝" OD, 28#, steel line pipe

5,000 feet of 8⅝" OD, 28#, steel line pipe (for road crossings)

TANKS

10—80,000 barrel tanks, 117' d x 41' high, riveted, steel roof

11—55,000 barrel tanks, 117' d x 29' high, riveted, steel roof

3—25,000 gallon tanks, 11' d x 33' high, welded, ¼" plate

1—20,000 gallon tank, 10'6" d x 31' long, riveted

1—16,000 gallon tank, 10'6" d x 20' high, riveted

15—Tanks, Heloise, Tennessee ranging in sizes from 11,000 gallons to 230,928 gallons capacity

ROGERS AND WRIGHT, INC.
710 Peoples Building (PHONE 3-0171)
Charleston, West Va.
216 West Second St. (PHONE 5-3229)
Tulsa, Oklahoma

DISMANTLING GASOLINE PLANT

7—CLARK GAS ENGINE GAS COMPRESSORS

One—230 H.P.—17x18x26x20
One—230 H.P.—17x18x24x20
One—230 H.P.—17x18x24x20
One—200 H.P.—16x7½x10x20
One—165 H.P.—17x6½x16x20
One— 80 H.P.—16x8½x20
One— 80 H.P.—16x7½x20

Complete and in good operating condition
Full specifications available on request

PROPANE and BUTANE STORAGE TANKS
TOWERS — VESSELS — PUMPS — BOILERS
INSTRUMENTS — PIPE — VALVES — FITTINGS, Etc.

This plant located near Benton, Illinois, ceased operating a few months ago due to shortage of natural gas.

Write for descriptive folder listing hundreds of other items.

BROWN-STRAUSS CORPORATION
P. O. Box 78 Norman Strauss
Kansas City 10, Mo. Phone HArrison 1000
Salesman on premises. Contact R. V. Crisp. Phone 1419 or 610, Benton, Ill.

EQUIPMENT FOR SALE

7500′ OF API Full Hole 4½″ Drill Pipe Graded and tested by Sonoscope engineers Milford Giffin, Giffin Hotel, Tel. 477, Hoisington, Kansas.

USED well drilling equipment. We buy and sell spudders, rotaries, core drills, tools, pipe, blocks, pump jacks, everything for well drilling and service. All used equipment fully reconditioned. Contact us for your requirements and save money. We rent fishing tools. Pressey & Son, Pueblo, Colo.

NEW STEEL TUBING

10,000 feet—4″ O.D.
10 gauge wall
Electric Weld
20′ lengths

10,000 feet—4″ O.D.
9 gauge wall
Electric Weld
with coating of asphalt and tar inside and out.
40′ lengths

60,000 feet—1″ O.D.
18 gauge wall
Electric Weld
20′ lengths

All or any part of the above available for immediate shipment at low warehouse prices. Subject to prior sale.

Write—Wire—Phone

SONKEN-GALAMBA CORP.
2nd and Riverview (X-938)
Kansas City 18, Kansas
THatcher 9243

EQUIPMENT FOR SALE

FOR SALE: 6 New 20,000 Gal. Underwriters Steel Storage Tanks, 5/16″ plate, welded. 10′6″ dia. x 31′ long. Located Springfield, Missouri, and Newark, N. J. Owner L. M. Stanhope, Rosemont, Penna.

USED PUMPING UNITS and engines. One Lufkin TC-1A-54B unit with Lufkin Cooper-Bessemer engine and one O.C.S. 40 H. P. Bat unit with Superior GB engine. Both are single reduction units. Located near Kermit, Texas. Cities Service Oil Co. (Penn.), P. O. Box 1117, Crane, Texas.

FOR SALE AT BARGAIN PRICES

Used Compressors 125 to 320 Hp. Clarks, Worthingtons, National Transits, Bessemers. Can be seen in operation.
Also, two — 150 Hp. Fairbanks-Morse Vertical Diesels, new 1943, used only one year.

WALTER J. CLARKE
5565 Wellesley Ave., Pittsburgh 6, Pa.

FOR SALE

3—CT14L 22.5 - hp. Cabot twin - crank, used, pumping units. 54″ maximum stroke, complete with U6 International engines.

1—30-hp. Ideco 54″-stroke, single reduction twin crank pumping unit, complete with 503 Fairbanks-Morse engine.

All material in good shape.

OVERTON SUPPLY CO.
Box 545 — Phone 2721
Overton, Texas

EQUIPMENT FOR SALE

FOR SALE: Wilson Giant Draw Works: 2—Buda JL-1335 Motors with chain compound: 2—Code Butane Tanks: 4 Sheave National Traveling Block: 1—HP-217 Buda Engine: 5000′ 4½″ Drill Pipe. All in good drilling condition. Powell Drilling Company, 306 Derby Bldg., Wichita, Kansas.

NEW FRACTIONATING TOWER

One (1) New fractionating tower, 5′ 0″ I.D. x 89′ 6″ over-all height x 1⅛″ plate. Thirty-four (34) bubble trays, ten (10) 18″ 300# manways. Stress relieved and built in accordance with API-ASME Code for 350 PSI working pressure. Located Watt Metal and Boiler Works, Houston Shops.

ROCK ISLAND OIL & REFINING CO., INC.
321 W. Douglas Wichita, Kansas
Phone 5-5674

FOR QUICK SALE!

ELECTRIC WELD LINE PIPE
HYDROSTATIC TEST 1000# P. S. I.

Excellent for Oil, Gas or Water Flow Lines

This stock is all completely new and unused. Lengths range from 20′ to 30′ and can be double jointed upon request.

34,000′	3½″ OD X .134″ wall	5.00#
82,000′	3½″ OD X .165″ wall	6.00#
41,000′	4″ OD X .148″ wall	6.00#
30,000′	4″ OD X .165″ wall	7.00#

Will trade for 4″ New Standard Black Pipe

Other pipe, too! Complete stock ⅛″ to 36″ Standard, Extra Heavy and Double Extra Heavy.

Telephone, Wire or Write

J. M. HAUCK
5543 Ashland Ave., St. Louis, Mo.
Telephones:
Day, GRand 6434 Night, COlfax 9145

FOR SALE

FRACTIONATION COLUMN and ACCESSORIES

Designed and fabricated by Braun to stabilize 6,000 bbls./day 67° API gravity crude.

Design: API-ASME code 200 psi W.P., 400° F., 375 psi Test
Dimensions: 66″ x 59′, .750″ Shell, .750″ Semi-Ellip. Heads, 30 trays on 18″ spacing, Weight 47,500#
Nozzles: One 6″ feed, one 3″ reflux, one 8″ vapors, one 8″ bottom, one 10″ vapor-return and two 3″ relief-valves.

Heat Exchangers

Braun, horizontal, removable tube bundle, seamless admiralty tubes, cast-semi-steel body.
4—18″ ID x 12′, 4 pass tubes 250 psi, 2 pass body 200 psi
2—15″ ID x 12′, 2 pass tubes 100 psi, 2 pass body 200 psi
2—22″ ID x 15′, 6 pass tubes 100 psi, 2 pass body 200 psi

Reboiler

Braun, kettle type, removable tube bundle, seamless admiralty tubes, steel body, 26″ x 48″ x 21′, 2 pass tubes 300 psi, body 200 psi at 400° F.

Steam Pumps

1—National Transite, Duplex, 8 x 4 x 12
3—National Transite, Duplex, 7½ x 5 x 10
2—Burnham, Simplex, 8 x 7 x 20

Reflux Accumulator 66″ x 12′
Piping, Valves and Fittings
Brown Instrument Controls
Located in Wyoming

Drawings and Specifications Available

For further information please contact:

The Ohio Oil Company
P. O. Box 120, Casper, Wyoming

For Sale

DOUGLAS DC-3
(CONVERTED C-47)

CUSTOM Executive Interior — DIVANS — Private Compartment

Total Hours to February 21, 1952

Airframe	2665
R/H Engine	585
L/H Engine	352

P&W R1830-92 Engines
6477A-0 (Paddle) Propellers

RADIO EQUIPMENT: 2 Bendix MN62 ADFs, 1 each: Bendix RA10 Range Receiver, Bendix MN53 Marker Receiver, RTA1B 50-watt MF Transceiver, ARC 3 VHF Transceiver, ARC Tunable VHF Receiver, Collins 17L Transmitter, Collins 51R2 Omni & Localizer Receiver, Collins 51V Glideslope Receiver.

INCLUDED SPARES: R1830-92 Engine, 6477A-0 Propeller, Miscellaneous Accessories, and Instruments.

For Information, Write

Box E-700
The Oil and Gas Journal
Tulsa, Oklahoma

EQUIPMENT FOR SALE

TANKS—One 10,000 bbl. Butler Bolted Tank Standing, $5,000.00. One 5,000 bbl. riveted Tank standing, $2,500.00. Will build 10,000 back bolted. Will cut riveted tank. Build back welded on your location. Reasonable price, located Arp, Texas. Also have 210 bbl. and 250 bbl. new and used in sets with stair and walk. Lester Anderson Tank Co., Ph. 68, Box 343, Arp, Texas.

GEO. FAILING core drill unit, Model 44, mounted on Ford truck. Complete with pipe and equipment. Kelly Heyen, Dorchester, Ill.

EQUIPMENT FOR SALE
Franks SAL-5000 rig, 2 NHS Cummins diesel engines. Franks rotary rig 96 feet. Jackknife derrick. Provided with pump drive. Good condition. Ready for immediate delivery. Box E-726, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: New Bovaird and Company double eccentric and single eccentric pumping powers at Garnett, Kansas. For price contact A. L. Rhodes, Deep Rock Oil Corporation, Garnett, Kansas, or Joe Huitt, Tulsa.

FOR SALE by Owner—Complete rotary rig and derrick; Waukesha motors; Oil Well Supply Company pump; Emsco swivel; Brewster rotary; 2500 feet 2" line pipe; 3500 feet 4½" drill pipe; all first-class condition; located near Belhaven, North Carolina. Will assume responsibility of shipping: Address 1095 National Press Building, Washington 4, D. C., or telephone National 9150.

WELL SERVICING UNITS—Skid type, Single Drum Cardwells, Wilsons, Allis-Chalmers, Muskogee, Keltner. Double & Single Pole Mast. Have Draw Works on long skids w/ 86' Double Pole Rotary Mast for shallow well rotary. For sizes & prices—Write General Tool & Supply Co., P. O. Box 4387, Oklahoma City.

ALL-WEATHER-TREATED Rough Service Light Bulbs, 10 to 1 you save with: "Dunkem-Squirtem-Hailem." Eliminate moisture breakage — liability — nuisance. "Dunkem-Squirtem-Hailem," Box 628, Canon City, Colorado.

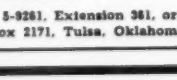
FOR SALE: 7¼x10 Gardner-Denver mud Pump, "FY-FXD." Skid mounted, V-belt driven by Climax R41 engine. Butane equipped. New 6½" liners and pistons. Ideal for Shallow Drilling to 3000'. Price $3,750.00. Located our yard, Grandfalls, Texas. Lasiter Drilling Company, Ph. 813, Box 1022, Del Rio, Texas.

FOR SALE: R. L. Cardwell Double Drum Spudder Type Unit complete with DHK Waukesha Motor, Light Plant, Tools for 4½", 5½", and 7" Casing; Tool House, Butane Tank, etc. $15,000.00. Box E-707, The Oil and Gas Journal, Tulsa, Oklahoma.

USED 2" LINE PIPE

We are offering, subject to prior sale, approximately 480,000 feet of 2" 3.75# Line Pipe, located in West Virginia. We are inviting inquiries from dealers, as well as consumers.

Phone 5-9261, Extension 361, or write Box 2171, Tulsa, Oklahoma



AIRPLANES FOR SALE

Douglas DC-3

We will replace our Douglas DC-3 equipment with Convairs this fall and winter. Will contract now for delivery as new equipment is delivered to us.

BRANIFF AIRWAYS, INC.
LOVE FIELD, DALLAS

Direct inquiries to:
Horace Bolding
Phone Dixon 1721.

EQUIPMENT FOR SALE

JACKS—Jacks—Jacks—Now is the time to place your order for Jenson Jacks; also have two Hundred ton Hydraulic Jacks. A. R. Daniel, Garnett, Kansas.

25,000' 2" P. E. LINE PIPE

FOR SALE: 25,000' 2" P. E. line pipe excellent for oil and gas lines priced way below OPS ceilings. Contact Edco Pipe & Supply Co., 45970, 310 Tuloma Building, Tulsa, Oklahoma.

POWER PUMP: Rebuilt 7-P (7¼x18) Wilson-Synder, complete, oilbathed, short skids, #10657, Jones, Shelburne, Guffey, 501 N.E. 28th, Oklahoma City, Oklahoma. 5-5448.

FOR SALE: One Ready-Power Engine Generator, complete with control cabinet with automatic or manual regulator switch. Specifications are KVA 28.75, KW 23, Volt 120-208, Amp. 64, Phase 3, Wire 4, RPM 1200, Cycle 60, will run on either gasoline or on natural gas. This has been used as a standard source of electric power but is in good condition. It may be inspected at our plant located eight miles South of Ulysses, Kansas, on Highway 270. Price, $1,500. Address inquiries to Hugoton Production Company, Garden City, Kansas.

FOR SALE at Sasakwa Gasoline Plant, 4000', 12¾" OD 33# and 2300', 12" OD 31# plain end line pipe. And at Pampa, Texas, 2500', 12" OD 31# plain end line pipe. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

FOR SALE: Westcott, Foxboro and Emco Gas Meters. George R. Milner, Box 124, Okmulgee, Oklahoma.

25 KILOWATT Fairbanks Morse 125 Volt Direct Current Electric Generator driven by Model D-382 Le Roi Gasoline Engine, complete with Electric Start, Fuel Tank and all Accessories. Mounted on Steel Base and with Panel Board. Weight Approx. 3500#. Unit reconditioned and guaranteed—$2,000.00 FOB Houston, Texas. Halloran Equipment Co., 5702 Harvey Wilson Drive, Houston 20, Texas.

WELL Drilling Rotaries and Spudders, bought and sold. Immediate delivery in most cases. Specify your requirements. Contact Francisco Gonzalez, Baker Export Co., Box 1128, Pecos, Texas.

FOR SALE: 36,000' 1¼" ID 3# PE SH Amonia pipe, regular random lengths, good condition, 20c foot FOB Tulsa, Richardson Supply Corp., 401 North Main, Tulsa. Telephone 3-6522.

USED rotary and cable tool drilling tools. E. A. Kelly, Box 861, Oklahoma City. Phone 5-8407.

STAR DRILLER 71 & Tools, Truck Mtd. Bargain for quick sale. Immediate Del. G. J. Stumpff, Box 1107, Goodyear, Ariz.

MOUNTED Rotary Drilling Rig, Dodge Truck. Complete 2000 foot capacity. Two men operate, fast, durable, efficient, roller-bearing throughout. Money maker shallow drilling, reverse circulation, clean-out. Box 106, Seminole, Oklahoma.

FOR SALE: Good 3½" and 4½" OD Drill pipe. Two EKU Waukesha's. One RL Cardwell, Hercules Engine, Tanks, Treaters, Pumping units. Rogers Pipe & Supply Co., 620 Wright Bldg., Tulsa, Oklahoma.

EQUIPMENT WANTED

WANTED—125-150 horsepower boiler 300# working pressure. Must be in good condition. Contact Leo Ekstrom, Anchor Gasoline Corporation, 714 Atlas Life Building, or phone 54-5201, Tulsa, Oklahoma.

WANTED—Cardwell Trailerig, Box 1137, San Antonio, Texas.

WANTED: 12,000' 7" OD 17# New Plain End Pipe. 7,500' 6⅝" OD 13# New Plain End Pipe. Public Service Corporation of Texas, 1002 Continental Life Bldg., Fort Worth, Texas.

1,400 FEET or less 3½" EUE or 2⅞" EUE drill pipe, new or good used. One 30 foot 4¾" drill collar, new or good used. Have PAD authorization for pipe. Box E-606, The Oil and Gas Journal, Tulsa, Oklahoma.

WE BUY well drilling equipment, machines, cable tools, pipe, etc. Turn your surplus equipment into cash. Pressey & Son, Pueblo, Colorado.

EQUIPMENT WANTED

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

HELP WANTED

ADMINISTRATIVE and field sales personnel. Engineering education and/or background necessary. Knowledge of petroleum and chemical industries desirable. Apply: The J. B. Beaird Company, Inc., P.O. Box 1115, Shreveport, Louisiana.

ELECTRICAL ENGINEER. A major midwestern refinery engineering firm with international operations needs graduate electrical engineer with experience in selection and installation of motor controls, switch gear and petroleum refinery electrical equipment. Some traveling required. This is permanent and responsible position with excellent future possibilities in progressive company with excellent program of employee benefits. Starting salary based on experience and ability. Applicants please submit resume which will be kept confidential. Box E-712, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: An oil Driller to drill in Michigan and Arkansas on 49:51 share. Wonderful prospect in Arkansas, near El Dorado Oil Fields. Individual preferred, rather than Company driller. Would also like drilling Equipment on Rental Basis. H. C. Wells, 4732 Prairie Ave., Chicago, Ill.

LEASE & TITLE MAN: Major Company, Illinois Basin, College education preferred, but not essential if experience adequate. Permanent position. Box E-727, The Oil & Gas Journal, Tulsa, Oklahoma.

ENGINEERS, Executives, Technical Men. Salaried positions—$3600 to $30,000. This confidential service for outstanding men who desire a change of connection. Will develop and conduct preliminary negotiations without risk to present position. Send name and address for details. Tomsett Associates, 334 Frick Bldg., Pittsburgh 19, Pa.

MEN to train for service engineer to service hydraulic oil well pumping equipment in California oil fields. Experience in servicing oil field mechanical equipment essential. Some engineering education desirable but not essential. Excellent future for men selected. Give full details of experience in first letter. Box E-719, The Oil and Gas Journal, Tulsa, Okla.

NOW READY. List showing where to apply for foreign jobs with oil companies and general contractors. Write for price. OIML Co., Box 2603, Tulsa, Okla.

CONSTRUCTION ENGINEER

Exceptional opportunity for a graduate engineer with definite experience in managing refinery construction and maintenance, preferably in Fluid Catalytic Cracking Plant. Apply Northwestern Refining Co., P.O. Box 248, St. Paul Park, Minnesota.

OIL INDUSTRY Employment Service, 405 Tuloma Building, Tulsa, Okla. 4-5974. Tom Robinson, owner. For technical and trained personnel. No fees. Confidential. Now needed: Jobber sales Engineer, Refined Oil Products.

KEY Seismograph Personnel Needed by Established and Expanding Seismograph Company. Box E-618, The Oil and Gas Journal, Tulsa, Oklahoma.

CABLE TOOL DRILLER: Good steady job for experienced man that can deliver. Bucyrus-Erie 24-L drill, some 6" work, some 9" to 20" pump and ventilation holes—must be straight, run pull and repair 12" and 14" turbine pumps with the drill. Work all daylight, 90 hour week 6 days and the job paid over $7500.00 last year. Good rock drilling with a little shale on top, 250' to 350' holes. Write Judd & Son, Shullsburg, Wisconsin.

GEOPHYSICIST

Major company operating contract crews only has opening for assistant to area geophysicist in Rocky Mountain Region. Applicant must have geologic degree, two to three years, seismograph experience. Give all details first letter.

Box E-720
The Oil and Gas Journal, Tulsa, Okla.

HELP WANTED

HELP WANTED

OPPORTUNITIES FOR TECHNICAL REFINERY PERSONNEL for LARGE INTERNATIONAL OIL COMPANY

Entertaining applications of graduate chemical, mechanical, structural and electrical engineers for refinery engineering assignments at home and abroad.

Engineers with refinery experience and also recent graduates will be considered.

Box E-667, The Oil and Gas Journal, Tulsa, Oklahoma

PETROLEUM ENGINEERS, Geologists, Draftsmen, and many other openings in the Rocky Mountain Area. We bring employer and employee together, match ability and experience with job requirements. For furthur information write Professional Placement Service, 516 University Bldg., Denver, Colo.

SITUATIONS WANTED

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico Personal interview by appointment is desired. Makin Drilling Company, Box No 1638. Ph. No. 131, Hobbs, New Mexico.

GEOLOGIST — District Geologist Major Oil Company employed San Antonio, Texas, desires change. Will relocate. Box E-717, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION MANAGER. Petroleum Engineer-Geologist. 38. Experienced land and leasing, negotiating drilling deals and contracts, and management drilling and producing operations in Kansas and Rocky Mountains. Desire responsible connection with active and financially sound operator. Box E-679, The Oil and Gas Journal, Tulsa, Oklahoma.

PROCESS ENGINEER desires connection with independent refiner in supervisory capacity. Fourteen years experience with major company. Familiar with all phases modern refining. Master's degree in Chemical Engineering. Age 36. Box E-714, The Oil and Gas Journal, Tulsa, Okla.

GEOPHYSICIST: Fifteen years' geophysical experience with major company, including field work, interpretation and supervision, desires supervisory position with smaller company. Box E-722, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: 5 years' experience, surface, reserve estimates, subsurface. Venezuela, desires position Rocky Mountain Area. Age 31, married, references. Box E-723, The Oil and Gas Journal, Tulsa, Oklahoma.

SUPERINTENDENT desires change, 23 years' experience in drilling, producing and operations of oil and gas wells. Engineering background, age 41. Box E-724, The Oil and Gas Journal, Tulsa, Oklahoma.

ACCOUNTANT

College Graduate, Married, Age 40. Experience includes oil, gas and public utility accounting; Federal and State income taxes; manual and machine accounting systems and procedures; and office supervision. Present position as Assistant Auditor offers no opportunity for advancement. **Box E-721, The Oil and Gas Journal, Tulsa, Okla.**

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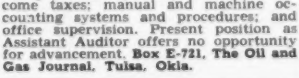
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Box E-709, The Oil and Gas Journal, Tulsa, Oklahoma

FOR SALE MAPS

PERMIAN BASIN wildcat map of West Texas & SE New Mexico. Scale 1"—64,000'. April issue now ready. Just like a newspaper—a quick glance and you know what's happening in the Permian Basin. Revised monthly. Single Copy $3.50. Midland Map Company, Box 1211, Midland, Texas.

NEVADA LEASE MAPS

Lease block maps of Elko Co. & White Pine Co. now available. $10.00 each; $18.50 for both maps. Scale 1" = 6 miles. Ownership maps also available. Nevada oil news. Filing information. Geologic consultants. Lease brokers.

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LEASE AND DRILLING BLOCKS

WILL pay cash instantly for leases (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

DRILLING DEAL—1,200 acres oil and gas leases on tightly held and highly potential Dora structure in eastern Roosevelt County, New Mexico. Also have some leases for straight sale. Information to capable parties upon request. Subject prior sale & confirmation. K. R. French, P. O. Box 238, Portales, New Mexico.

WANTED: Producing Oil Royalties and Overrides, Large or Small, Any County, Any State, pay you right off. Wire—Write—Call, Jack Eagle, 311 City Nat'l Bldg., Okla. City, Okla. Phone—REgent 6-7027.

OIL PROPERTIES: farmouts. Lease surrounded by production. Box 6008, Dallas, Texas.

MONEY AVAILABLE for drilling in 6-8 months. New corp. selling $300,000 stock issue wants attractive deal. Box E-711, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL, MINING LEASES, options wanted. Prefer up to $1-$3 acre. Apt. 9R. 405 E. 54th St., New York City.

MINERAL Deeds for sale McKenzie County and other areas North Dakota. Reply to Box 941, Houston 1, Texas.

WANT TO PURCHASE all capital stock of oil or gas company, showing operating loss, must be corporation. Box E-716, The Oil and Gas Journal, Tulsa, Okla.

ACREAGE Investments. One acre up. Proof 5 to 20 for one being made. Stands Investigation. E. M. Adams, Marshall, Tex.

NEW MEXICO
ROOSEVELT & DEBACCA COUNTY

Three important wells to be drilled on Seismograph structures. One well located within ½ mile of indicated San Andreas producer. Data covering these potential Oil & Gas Fields furnished interested operators and investors.

W. J. PETERMAN, GEOLOGIST
809 S. Chicago Portales, New Mexico

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Phone 40-228 Minot, North Dakota

GET IN ON A "MAJOR" PLAY!

Major Oil Companies and a large number of progressive independents are making a great lease play in certain areas of Western Kansas, and we have some well located leases and royalties right in with and under the big company spreads. Here is the small man's chance to be in on the ground floor of a 'big company' play. Write us for full details.

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Tulsa, Oklahoma

LEASE AND DRILLING BLOCKS

FOR SALE: Four oil and gas leases in shallow territory, two large leases excellent for water flooding, all in Allen County, Kentucky. Buel Wilson, Box 184, Scottsville, Ky.

WE invite inquiries from persons interested in Oil and Gas Leases in Southern Alberta, North Central Montana and the Williston Basin. Box E-664, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION FOR SALE

We have several producing oil leases for sale in West Texas, on which there are many proven locations. Will furnish details to qualified buyers only—no brokers or promoters.

Box E-713
THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

ROYALTIES

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Millions of acres now leased by world's major companies, with huge drilling play in prospect. For booklet describing Montana geology and oil development, write Landowners Royalty Company, Box 1238, Great Falls, Montana.

WILLISTON MINERALS

Send for list. Can offer Williston Basin minerals for $10 per acre with $1.00 annual rentals. Can sell in minimum tracts of 40 acres. Solicit sales only to those connected with oil or royalty business. References exchanged. Write or call Milburn & Milburn, Sewell Building, Telephone 6-6439, Odessa, Texas.

WE will buy producing or non-producing oil royalties. Standard Security Company, 111 Broadway, New York 6, N. Y.

BUSINESS OPPORTUNITIES

EAST OKLAHOMA Hydrofrac Prospects Geologist and company manager have data on shallow sands with employers permission to use. Are interested in venture with reliable parties to develop. Others please do not inquire. Box E-725, The Oil and Gas Journal, Tulsa, Oklahoma.

SERVICES

FLUORESCENCE measured accurately. Mail soil samples in small bottles, carefully numbered. Make your own map. Include it if you wish my comments. Return report next day. One dollar per sample. P.O. Box 630, Stillwater, Okla.

LEGAL BLANKS

BURKHART LEGAL BLANKS since 1908 Oil-Gas (all states), Business, Real Estate Legal Forms, Leases, Revised With Government Regulations, Commercial Printing Catalog and Samples on request. Burkhart Printing & Stationery Company, 115 South Cincinnati, Tulsa, Oklahoma.

EQUIPMENT MEN

(Continued from page 229)

Reeser, vice president and secretary, and D. M. Horner, vice president, have been elected to the board of directors of the company.

Reeser, whose primary responsibility is sales, has been associated with the corporation for 34 years. Horner, in charge of engineering and operations, has been employed by Harrisburg for 24 years.

Other directors of the corporation are: Richard J. Buck and Charles Garside, New York City; C. L. Keister, J. T. Simpson, and Edgar Z. Wallower, all of Harrisburg, Pa.

Spring Sales Meeting Held by Guiberson

Field representatives and sales officials of Guiberson Corp. in attendance at the recent spring sales meeting of the company at the Dallas plant were, front row: C. L. Forcum, C. A. Teel, W. E. Nolan, Jr., D. L. Fry, R. Z. Mendenhall, H. S. Zane, Jr., A. P. Smith, R. L. Lindsay, D. L. Moss, L. E. Brookover, and H. W. Haltom; middle row: A. E. Brummett, J. P. Killingsworth, R. A. Day, H. M. Cherry, R. J. Foreman, L. T. Ferguson, E. E. Embury, W. V. Phillips, W. R. Forcum, and J. T. Anderson; back row: O. A. Hess, R. L. McAdams, C. E. Lance, R. W. Lindsay, Jr., F. F. Bridwell, D. W. Watson, D. L. McGill, L. E. Vessels, B. M. Matthews, D. Burris, and D. B. Craver.

Discussions of increased sales and of new and improved Guiberson oil-tool equipment highlighted the annual spring sales meeting of Guiberson Corp., according to Sales Manager Harry S. Zane, Jr. The meeting, attended by Guiberson field representatives and sales officials, was held in late March at the company plant in Dallas.

Alex P. Smith, executive vice president at Guiberson, stressed the company's increase in sales over a comparable period in 1951 and pointed out that Guiberson's staff of field representatives had increased to 28.

A discussion of the uses of Guiberson's new Type H1 Hydraulic Hold Down Anchor was conducted by Zane.

Chief Engineer Tom Losey headed a discussion on Guiberson gas-lift equipment.

Gillespie Made District Manager by Beaumont Iron

C. P. GILLESPIE

C. P. (Smiles) Gillespie is new district manager for sales of Beaumont Iron Works Co. drilling and producing equipment in Louisiana, Mississippi, and Arkansas, according to a recent announcement by T. L. (Doc) Fontaine, president of Atlas Engineering Works, sales agents for Beaumont Iron Works.

Gillespie has had more than 35 years' experience in the oil business. Having been associated both with major oil companies and with equipment manufacturers, Gillespie is in a splendid position to help oil men in various phases of the oil business.

Murphy Safety Switch Names Distributor in Mexico

Murphy Safety Switch Co. has appointed Gallardo Y Lowenstein, S. A., as its exclusive distributor of automatic devices for internal-combustion engines in Mexico. Distributors in each municipality or area will be appointed by this Mexican firm.

Murphy safety switches are adaptable to all types of spark-operated engines. They are safety devices used to prevent engine failure due to lack of oil or other lubrication, or defective cooling systems.

Zagst Is Waukesha General Manager, Engine Sales

C. O. ZAGST

Charles O. Zagst, former district sales manager for Waukesha Sales & Service Co., Houston, has been named to the newly created position of general manager of engine sales for Waukesha Sales & Service, Louis Pearce, Jr., president, has announced.

Zagst joined the Waukesha sales organization in Houston in 1949. Before joining the Waukesha organization, he was a field engineer for Shell Oil Co. and later a drilling superintendent for Austin Stewart Drilling Co. Zagst is a graduate engineer from University of Texas.

Jordan to Head Tulsa Sales Office for Sterling

B. G. JORDAN

Opening of a new sales office in Tulsa has been announced by Alan J. Bronold, sales manager for Sterling Electric Motors, Inc., of Los Angeles, to serve the state of Oklahoma. B. G. Jordan has been appointed manager of the Tulsa office. Jordan is a graduate in mechanical engineering from University of Oklahoma and is prepared to render application engineering service to the petroleum, industrial, chemical, and commercial requirements of the area.

The Tulsa area was formerly served by the Kansas City, Mo., office of Sterling Electric. The Tulsa office will continue under the administrative direction of Alan B. Collins, Kansas City district manager.

ADVERTISERS IN THIS ISSUE

Abegg & Reinhold Co. 189
Acme Fishing Tool Co. 222
Aerotec Corporation, The 7
Allis-Chalmers Mfg. Co. (Tractor Division) 174
American Car and Foundry Company 37
American Iron & Machine Works Co. 176
American Manufacturing Co. of Texas 4
American Meter Company 49
American Recording Chart Co. 200
Ansul Chemical Co. 201, 218
Armco Drainage & Metal Products, Inc. 102
Associated Research, Incorporated 170
Axelson Manufacturing Company 40
Baash-Ross Tool Company 207
Baker Oil Tools, Inc. 88
Berg Pipe & Steel Corp. 217
Black, Sivalls & Bryson, Inc. 125
Boston Woven Hose & Rubber Company 16
Bovaird Supply Co., The 19
Brown Fintube Co., The 172
Bucyrus-Erie Co. 74
Byron Jackson Co. 55
Byron Jackson Co., PB Division 45
Camco, Incorporated 178
Cameron Iron Works, Inc. 42, 43
Caterpillar Tractor Co. 15
Chapman Valve Mfg. Co., The 25
Chemical & Geological Laboratories 214
Chevrolet Motor Div., General Motors Corp. 20
Chicago Bridge & Iron Company 101
Chicago Metal Hose Division, Flexonics Corporation 52
Classified Advertising 231, 232, 233, 234
Cleaner Pipelines Co. 180
Cleveland Worm and Gear Co., The 22
Colorado Fuel and Iron Corp., Wickwire Spencer Steel Division 41
Construction Machinery Co's 148
Continental Electric Co., Inc. 170
Darling Valve and Mfg. Co. 81
Day Company, S. D. 195
Dean Brothers Pumps, Inc. 192
De Laval Steam Turbine Co. 65
Delta Engineering Sales Co. 197
Detroit Diesel Engine Division, General Motors Corp. 30
Dow Chemical Co., The 61
Dowell Incorporated 86
Drilling & Service, Inc. 223
Drilling Specialties Co. 198
Duff-Norton Mfg. Co. 214
du Pont 38
Eaton Manufacturing Company, Axle Div. 33
Empire Trust Company 213
Ensign Carburetor Company 69
Fairbanks, Morse & Co. 2
Farrel-Birmingham Co., Inc. 17
Federated Metals Division, American Smelting and Refining Company 165
Fisher Research Lab, Inc. 190
Fluid Packed Pump Company 77, 78
Fluor Corporation, Ltd., The 154
Foster Wheeler Corp. 75
Gates Rubber Co., The 47
General American Transportation Corporation 121
General Electric Company 63
General Electric Co., Electronic Dept. 23
Gilmer Company, L. H. 158
Glitsch & Sons, Inc., Fritz W. 134
Goodyear Tire & Rubber Company 9
Gott Mfg. Co., H. P. 165
Grancell, I. H. 189
Griffenhagen & Associates 159
Guiberson Corporation 3
Gulf Oil Corporation 31
Halliburton Oil Well Cementing Co. 14
Harco Corporation, The 28
Harnischfeger Corp. 36
Haupt & Co., Ira 150
Helicoid Gage Division, American Chain & Cable Co. 80
Hinderliter Tool Co., Div., H. K. Porter Company, Inc. 84
Honan-Crane Corp. 139
Hudson Engineering Corporation 136, 137
Huey & Co., S. E. 195
Hughes Tool Co. Back Cover
Independent Exploration Co. 28
Inferno Co., The 209, 222
Insley Manufacturing Corporation 162
International Harvester Co. 129
International Petroleum Exposition 12, 13
Jacobson, E. C. 223
Jarecki International Supply Division, H. K. Porter Company, Inc. 156
Jensen Brothers Mfg. Co. 217
Johns-Manville Corporation 166
Johnson Plastic Corp. 203
Johnston Testers, Inc. 48
Jones & Laughlin Steel Corp. 64
Jones & Laughlin Supply Co. 27
Kerotest Manufacturing Co. 219
Kieley & Mueller, Inc. 70
Kimray, Inc. 220
L-K-R Chemical Products Corp. 192
Lane-Wells Company 58
Larkin Packer Company, Inc. 210
Leland Equipment Co. 82
Levingston Shipbuilding Co. 201
Linde Air Products Company, A Division of Union Carbide and Carbon Corp. 135
Lloyd Metal Foundry Co. 193
Lufkin Foundry & Machine Co. 56
Manhattan Rubber Division, Raybestos-Manhattan, Inc. 72
Manning, Maxwell & Moore, Inc. 32
Mark & Company, Clayton 163
Marlow Pumps 203
Marsh Instrument Co. 39
McCord Corporation 197
McCullough Tool Company 236
Metal Goods Corporation 8
Midwest Piping & Supply Co., Inc. 44
Minneapolis-Moline 18
Minnesota Mining & Mfg. Co. 181
Mission Mfg. Company 155
Monsanto Chemical Company 6
Moore Corporation, Lee C. 140
Murdock Tank & Mfg. Co. 222
Nash Engineering Co. 62
National Airoil Burner Co., The 197
National Aluminate Corp. 108
National Tube Company 50, 51
Nelson Electric Mfg. Co. 188
Nordberg Mfg. Co. 221
Nordstrom Valve Division, Rockwell Manufacturing Company 53
Oakite Products, Inc. 170
Oil Center Tool Co. 202
Oil Equipment Mfg. Co., Inc. 146
Olson Drilling Co. 204
Orbit Valve Company 83
Otis Pressure Control, Inc. 149
Pacific Coast Borax Co. 163
Paris Distributor, Inc., Henry H. 188
Parkersburg Rig & Reel Co. 205
PB Division, Byron Jackson Co. 45
Pelton Water Wheel Co. 145
Penn Controls, Inc. 152
Perrault Brothers 195, 222
Petro-Chem Development Co., Inc. 132
Petroleo Interamericano 185
Petroleum Distributing Co. 190
Petroleum Electric Power Association 21
Pioneer Rubber Co., The 221
Price Company, H. C. 194
Pyrene Manufacturing Company 216
Rasmussen Mfg. Co. 165
Raybestos-Manhattan, Inc., Manhattan Rubber Division 72
Rector Well Equipment Co., Inc. 35
Reed Roller Bit Company Front Cover
Refinery Supply Co., The 5
Republic Steel Corporation 71
Ridge Tool Company, The 144
Rockwood Sprinkler Co. 60
Roebling's Sons Company, John A. 24
Ross-Martin Co. 213
Royal Bank of Canada, The 211
Rust-Oleum Corporation 11
Sawyer & Son Co., The H. M. 198
Schield Bantam Company 167
Schlumberger Well Surveying Corp. 67
Seismograph Service Corp. 105
Shand & Jurs Co. 139
Sivalls Tanks, Inc. 215
Smith Oil Tool Co., H. C. 188
South Texas National Bank 209
Southern Mill & Mfg. Co. 34
Standard Oil Company of Indiana 59
Standco Brake Lining Co. 190
Stoody Company 152
Sun Shipbuilding & Dry Dock Company 208
Superior Iron Works & Supply Co. 68
Taylor Woodrow (Building Exports), Ltd. 10
Templeton, Kenly & Co. 190
Thermix Corporation, The 7
Thermoid Company 66
Thomas Flexible Coupling Co. 151
Thompson Pump Company 213
Thompson Tool Co. 206
Torrington Company, The 54
Tretolite Company 29
Tulsa Crating Company 221
Turner Uni-Drive Company 128
Twin Disc Clutch Co. 219
Underwood Corp. 217
Union Asbestos & Rubber Co. 57
Unit Rig & Equipment Co. Inside Front Cover
U. S. Steel Corp. Subsidiaries 50, 51
United Supply & Manufacturing Co. 147
Universal Oil Products Co. 142, 143
Van Dyke Industries 208
Victaulic Co. of America 212
Victor Products Corp. 197
Vogt Machine Co., Henry 46
Walworth Co. 1
Warner Lewis Company 195
Waukesha Motor Company 73
Well Equipment Mfg. Corp. 79
Western Pipe Line Constructors 186
Western Supply Company 153
Wheatley Pump & Valves, Frank 186
Wickes Boiler Co., The 167
Wickwire Spencer Steel Division, Colorado Fuel and Iron Corp. 41
Williams Brothers 193
Williamson, Inc., T. D. 194
Wisconsin Motor Corporation 201
Worthington Pump & Machinery Corp. 228
Wyatt Metal & Boiler Works Inside Back Cover
Ya-nall-Waring Company 76

LEGAL

Notice is hereby given that sealed bids on Oil and Gas leases on 2,086.78 acres of Tribal Indian lands on the Fort Peck Indian Reservation, Roosevelt County Montana, will be opened at 2:00 o'clock P. M., April 30, 1952, in the office of the Superintendent, Fort Peck Indian Agency, Poplar, Montana. Those individuals desiring specific information in connection with this sale of leases may contact Mr. James D. Crawford, Superintendent, Fort Peck Agency, Poplar, Montana.

LEGAL

Notice is hereby given that sealed bids on oil and gas leases on 14,920.85 acres of Allotted Indian lands on the Fort Peck Indian Reservation, Roosevelt County, Montana, will be opened at 2:00 P. M., April 30, 1952, in the office of the Superintendent, Fort Peck Indian Agency, Poplar, Montana. Those individuals desiring specific information in connection with this sale of leases may contact James D. Crawford, Superintendent, Fort Peck Inrian Agency, Poplar, Montana.

TABLE OF CONTENTS ON PAGE 87

What's NEW

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NEW WAYS OF DOING THINGS

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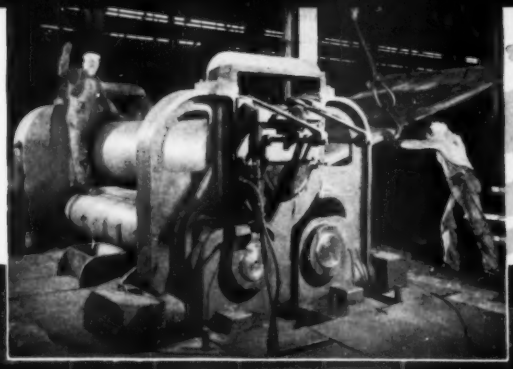
BIRTH OF A *150-TON* STEEL BABY



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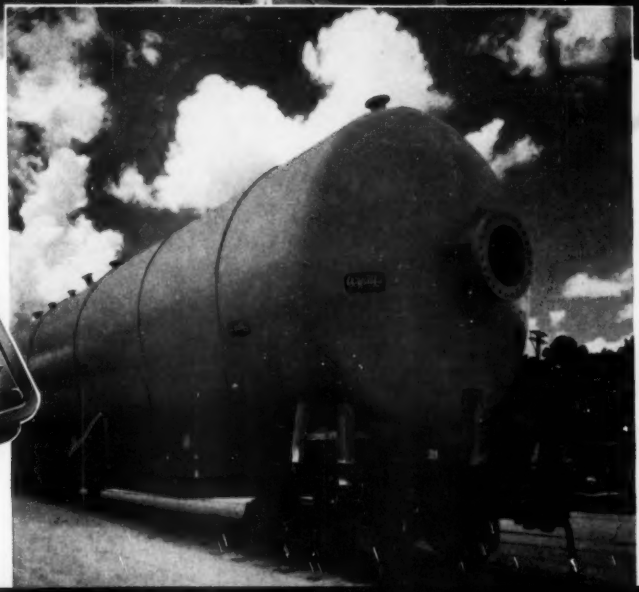
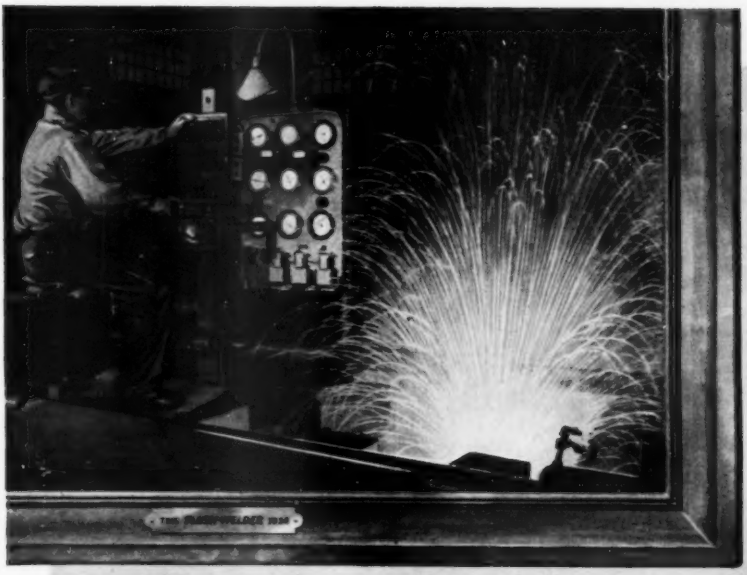
FABRICATORS
AND ERECTORS
SINCE 1913

Austin

HOUSTON-DALLAS-NEW YORK-TULSA





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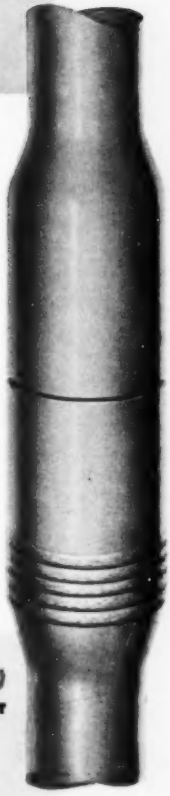
The *Flash Weld* tool joint is a good example of the research, experience, engineering skill and knowhow that go into an original development.

Seventeen years ago, when HUGHES inaugurated the research program that produced the first unitized drill stem, it already had a long series of successful tool joint developments to its credit.

HUGHES had, for instance, developed the first heat-treated alloy steel tool joint; first bucked on tool joint; first bucked on and welded joint; first bucked on and counter-bore welded tool joint.

When you specify HUGHES *Flash-Weld*, you get *the original* integrally welded tool joint with the proven performance record! And you are assured the best drill stem obtainable.

More than 20,000,000 feet of drill pipe have been unitized with HUGHES *Flash-Weld* tool joints since 1938.



FLASH-WELD
A DEVELOPMENT
OF
HUGHES
TOOL COMPANY
HOUSTON, TEXAS